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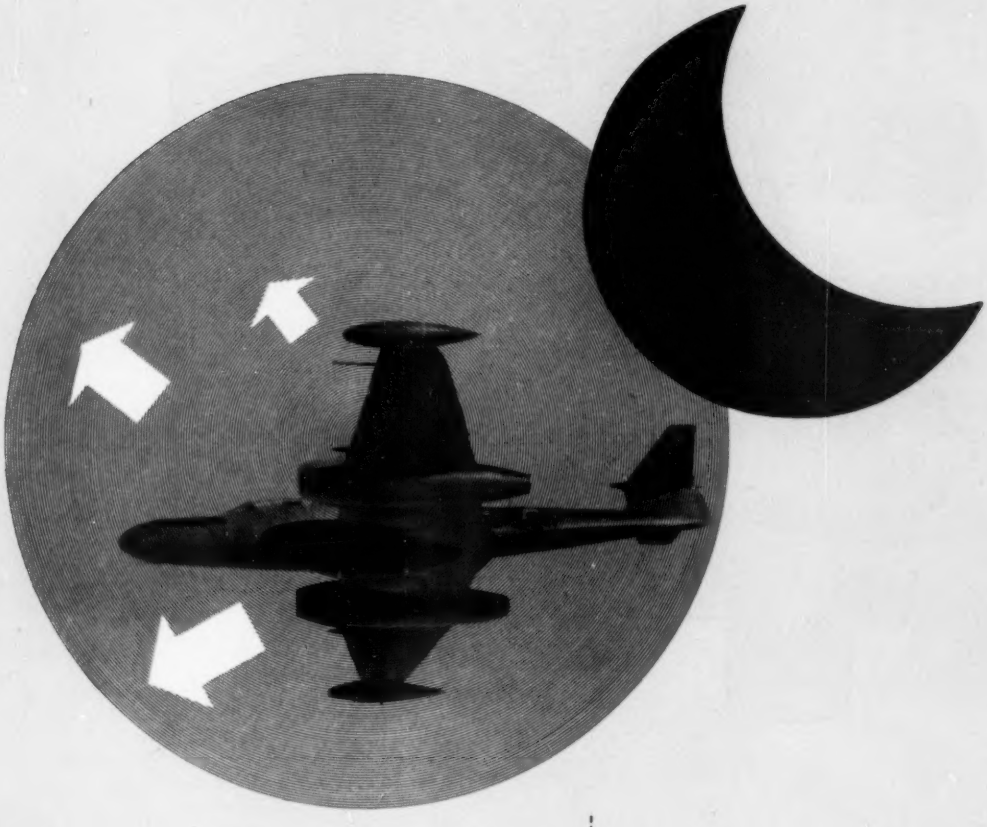

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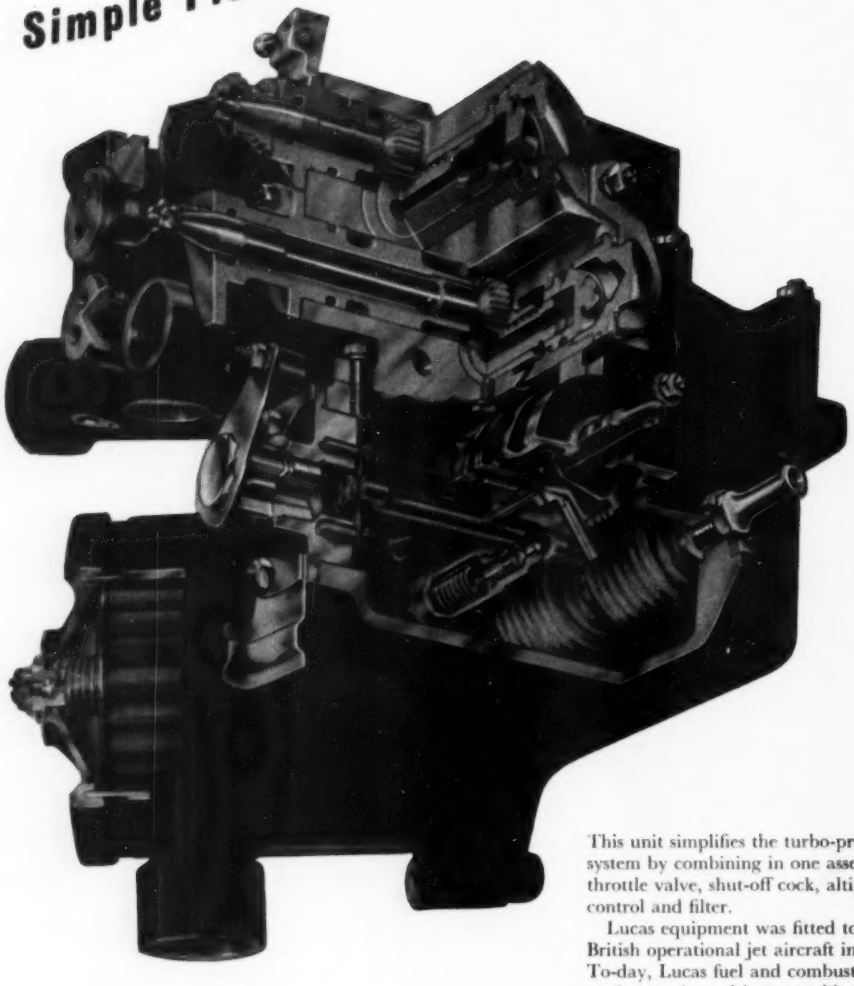

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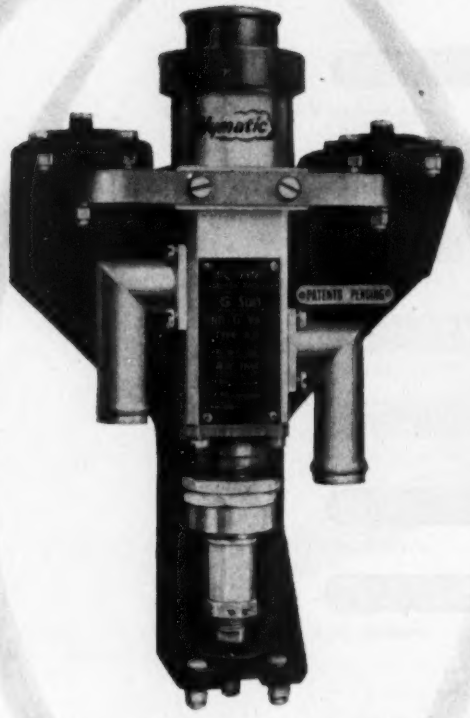

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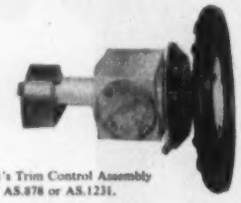

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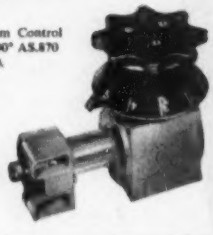

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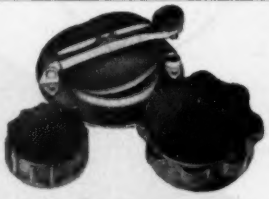

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C

Enough Said

LITTLE would now be gained by trying to apportion blame for the alarming state of affairs laid bare before Parliament by the Under-Secretary of State for Air when he presented the Air Estimates last week. He gave the details with candour, and though there was little new in the picture it was particularly complete and drawn in excellent perspective. A digest of his speech appears on pages 346-347. Mr. Ward understands his subject; his was no "jobs for the boys" appointment.

The unpalatable facts about Britain's air strength will not have taken *Flight* readers by surprise, for we have consistently kept them informed over a period of years, both in our own words and in the reported views of independent observers. But it is alarming that large sections of the general public should have been misled as to the extent of our deficiencies—mainly by the complacent assurances from members of the late Government.

The Debate, then, has confirmed our fears and perhaps added to them. What makes it all the harder to bear is that even now nothing very concrete has emerged upon which real hopes can be built. "Super priority" will fast become an empty catch-phrase unless the measures that will give it substance—some have just been announced—are implemented forthwith. Many who looked to the Government for an immediate lead following the Prime Minister's urgent warning on March 5th have already begun to feel let down because they have been given no part to play in the common effort.

Mr. Ward admitted that our air defences are inadequate; but most of us have known this for months. He said that we have no R.A.F. fighter to match the Mig 15—old news again. He said that we "need the wholehearted co-operation of everyone"—after-dinner stuff. We must have the war-time spirit throughout industry today—fine, fine, we all agree. But about this super priority? There he stopped short. It has since been learned however that details of how "super priority" is to function were to be made known this week and some preliminary facts appear overleaf.

An "urgent" label has been tied to two types of prototype day fighter, unproved, but believed better than the Sabres and Mig 15s which are in service in their hundreds. Four other types of aircraft have now been included. But production of military aircraft is a subject about which verbal assurances have become almost meaningless.

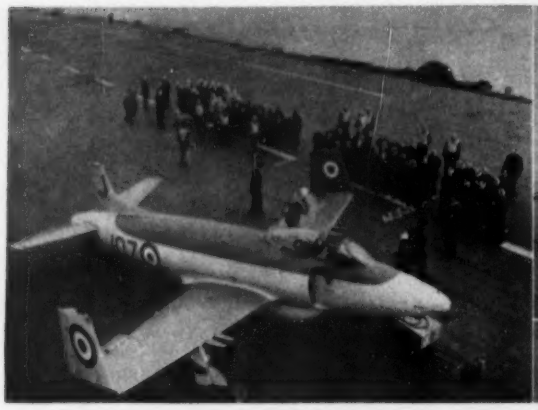
Not only the executives but the men who build the aircraft, and the public who pay and anxiously await security through strength, if not through international understanding, need to have evidence of a practical scheme if it is to be backed by national effort. The Prime Minister used an un-Churchillian phrase in giving precedence to the Swift and Hunter, but everyone assumes that truly Churchillian action will follow.

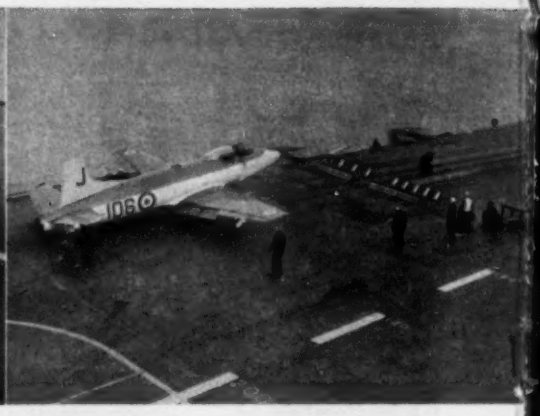
Husbanding Man-hours

Suggestions as to how production commitments might be more easily met have been made in some of the many speeches delivered during this and other Debates. Mr. Ward himself rightly accentuated in his statement the need for simplified manufacture and maintenance, and in this connection we as a nation should not be too proud to ask and accept more help from our American friends. Simplified fighters and bombers have been suggested, and there have been hints of plans to build, in this country as well as abroad, such aircraft as the American pilotless and expendable Matador.

Mr. Ward, in a reply, stated that he was also examining the possibility of radically cheapening and simplifying the designs of fighter aircraft to be used in limited and specialized rôles. Certainly, if relatively cheap and simple products can replace a proportion of the massive and complicated fighters and bombers of the present generation —and we believe that they can—their development also calls for top priority in both the aircraft and electronics industries.

We cannot leave the subject of the Air Estimates Debate without expressing regret that Transport Command's expansion is not to be increased. We agree with Mr. Profumo's assertion that the placing of orders for civil as well as for military transports would be invaluable in removing the atmosphere of impermanence which surrounds the aircraft industry, and thus help to attract back to it many much-needed craftsmen.





"EAGLE" WORKS UP

A Day in the Navy's Newest Aircraft Carrier—Jet-squadron Training

By THE EDITOR

IT is one thing to read about the Navy's carriers and the squadrons embarked in them, and quite another to have the personal experience of spending a day with them. Such an opportunity, which came my way last week, served both to recall a much earlier experience and to provide some telling comparisons between impressions on the two visits.

H.M.S. *Eagle* is the latest carrier to be commissioned in the Royal Navy, and her equipment and trials formed the subject of an article in our November 30th issue. Since that time, she has been taken over—Captain Guy Willoughby, R.N., signed for her about one month ago—and several aircraft have been embarked in her by No. 800 Fighter Squadron and No. 827 Torpedo Squadron. No. 800 were the first squadron to be equipped with Attackers, and are now the first to operate them—at half strength—from a carrier. During my visit, five were catapulted off, and after simulated rocket-attacks on the ship, and other exercises, landed-on an hour later. No. 827 Squadron flew-off five Firebrands for similar training exercises, and in addition, two old Firefly Is were operated. The Commander Air is Cdr. N. K. Campbell, M.B.E., D.S.C., R.N.

Having established myself in one of the gun sponsons overlooking the flight deck at the after end of the island, the first impression I registered was of the width and length as compared with my imagined picture. In fact, the flight deck appeared wider but shorter than I had expected.

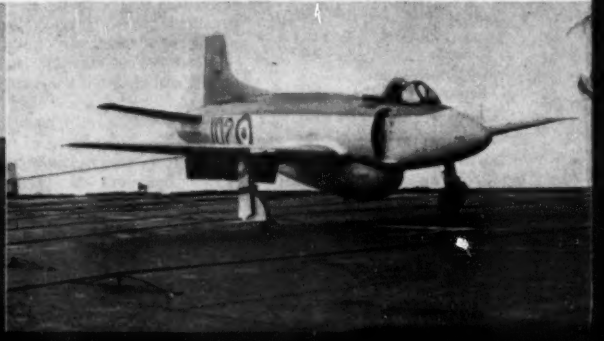
Drawn up at the after end were the piston-engined types, and spread out below and forward were the Attackers to be catapulted. All over the deck were smart, quick-moving crews, the colours of whose helmets clearly indicated their duties. The fire party, for example, have bright red helmets, and the chockmen's are blue; the deck engineers in charge of barriers and wires have black-and-white headgear, and the messengers have green. Batsmen and directors wear yellow helmets, and the aircraft servicing teams white. Nearly all wear navy-blue overalls, although green proofed-suits are worn as protection against kerosine, and asbestos suits protect some members of the fire party. Since the jets were embarked, the batsmen have taken to wearing additional light-yellow strips on their arms. When controlling the aircraft landing-on they are, in any case, silhouetted against the white retractable screen which protects them from the wind sweeping the flight-deck.

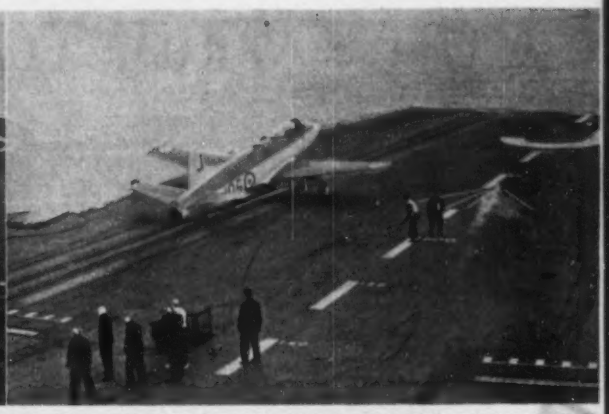
Looking down on the parties of men as they fell out from abreast the island, and bounced off to their various goals among the aircraft, one had the odd impression of dozens of coloured footballs bright against the dark blue-grey deck. By this time *Eagle* was steaming into wind at some 20 to 25 kt in a flat green foam-flecked sea, lighted here and there with shafts of sunlight, and astern the attendant destroyer pitched and weaved in the carrier's huge wake.

Captain Guy Willoughby, R.N., of H.M.S. "Eagle."

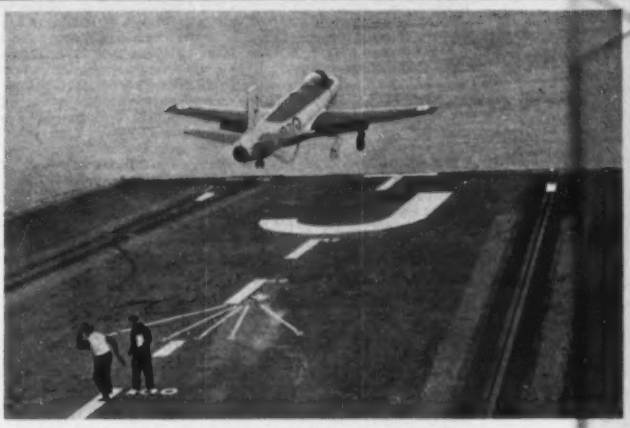
Five Attackers were due off first. All started up with the aid of starter-acc trolleys, each aircraft with its chockmen lying alongside the main wheels. In quick succession they were taxied and lined up on the catapult, hold-back link and harness were attached, and the Attackers were launched into the air. The whole proceeding was completed in about ten minutes—which, for a ship at an early stage in the working-up process and with the first squadron to operate these jet fighters, was very creditable. A limiting factor in speed of launching seemed to be the time taken to get the catapult trolley back to the starting position for the aircraft bridle to be attached. *Eagle* is at present fitted with a pair of the standard type of hydraulic catapults, but it is understood that the new steam catapults will be installed later.

The catapults—flush slots in the deck and some 50 yd long—have two retractable barriers which fold up from the deck at the





Attackers of No. 800 Squadron together provide a pictorial sequence of carrier operation. (Top left) The flight-deck parties in their "team colours" are about to disperse to their various duties in preparation for flying-off both Attackers and Firebrands. The aircraft are next seen taxying and lining-up against the port catapult barriers, and then during acceleration and take-off. Note that the ship is steaming 10 degrees out of wind; that the catapult is toed-in; and that the pilot's enclosure is open for take-off and landing. (Below, opposite) An attacker pilot has just been given the "cut" by the batsman, and, in the second picture, is firmly hooked and arrested. "Flight" photographs



starting end. The Attackers taxi up under their own power until the wheels come up against the first barrier and the aircraft is then resting upon a powered conveyor-track which can move it athwartships for lining-up. Two fore-and-aft folding guides are also provided for the tailwheel. When the aircraft has been jerked into the lined-up position, the first barrier is retracted and the fighter rolls forward to the second barrier, which marks the starting-point. It is here that the hold-back strop and bridle are attached. When all is ready, the pilot opens-up to full thrust and signals with his hand that he is ready to go. At this moment the catapult-control officer has his green flag raised; then, having received the pilot's signal and satisfied himself that all is ready, he drops the flag and within a matter of seconds the catapult is operated. In approximately 40 yd the aircraft is accelerated to just over 100 kt and takes off, leaving the catapult trolley a few feet in which to slow down before reaching the end-stop. The bridle falls away as the Attacker leaves the bows of the ship.

During flying-off and landing-on, the cockpit enclosure of the aircraft is always open, and as soon as the pilot has given his signal of readiness to be catapulted he holds the stick central with his elbow tucked in and braced against his hip so as to keep the elevators steady during the period of acceleration.

As soon as the Attackers had been catapulted off and had formed-up, the five Firebrands flew off under their own power, seemingly with great ease, and the ship's gunners prepared to receive warning of the simulated rocket-attacks and, later, the co-ordinated torpedo and rocket attack by the two squadrons. The guns are radar-laid, and I would not have fancied the chances of the Firebrand pilots. The Attackers, which were not visible until they began their attack, came in from about 6,000 to 8,000ft in a steep dive, roughly in line astern.

After the exercise had been completed, and following a very neat formation fly-past, the Attackers prepared to land-on. The batsman took up his position, and the arrester wires were all checked. No safety barriers are as yet available for the jet aircraft.

The Attackers approached fairly widely separated, from well astern and at a very shallow angle. The pilots told me that their speed when they come under the control of the batsman is about 105 knots.

The "cut" from the batsman having been received, the sound of the turbojet starts to die immediately but the aircraft does not drop quite so quickly as is the case with an airscrew type. Nevertheless, none of the Attackers engaged higher than the seventh of the fourteen arrester wires, and all were taxying ahead to the forward lift within seconds of touch-down. Rough timing showed that less than a minute elapsed, on an average, between touch-down and the time when the aircraft had been struck down to the hangars and the lift had returned to the flush position in readiness for the next machine to land. Although almost everyone is a little startled to see their first jet hauled to a standstill by the arrester wires—as, in fact, they are to see their first jet thrown off by catapult—by the time one has seen five make safe and unspectacular landings the performance can be regarded as one to inspire surprised confidence, rather than otherwise.

One could not help remarking upon the tremendous advantage of having power-folding for the wings and power-retraction of the hook. Whereas the Attackers each landed, disengaged their hooks, folded their wings and taxied on to the lift virtually unaided, the piston-engined types have usually to be disengaged from the arrester wires by two men and lined-up on one side of the deck prior to having some dozen men fold each wing manually. The engines have, of course, to be stopped in the meantime, and so a tractor or manpower must be used to position them back on the lift. It was also noticeable that, in preparing for take-off, a great deal of delay was involved in warming-up and running-up the piston-engined types before the signal could be given for take-off. The jets, nevertheless, would profit from a self-contained starting system.

During my final hour in *Eagle*, as she steamed back towards Portsmouth and her anchorage at Spithead, I was able to see something of the engine room, damage control, internal communications system, and the general layout of this remarkable ship. Her bulkheads are so arranged that one must be remarkably fit to traverse the length of the ship, necessitating as it does a great deal of up-and-down work in addition to sheer distance. She is said to be virtually unsinkable.

Her manœuvrability and smoothness were well demonstrated during the afternoon's programme, when, in calm sea, it was necessary to look down at the racing water to detect any motion.

By early summer, when the present and a second working-up period have been completed, the pilots and flight-deck parties will be more experienced and even quicker in their work than they are now. Two complete squadrons will have been embarked, and *Eagle* will be ready for any commission which comes her way. If the need should arise, she could probably accommodate four or even five squadrons.

FROM ALL QUARTERS

"Super Priority" Measures

AT a conference due to be held last Wednesday, March 26th, Mr. F. C. Musgrave, C.B., Deputy Secretary of the Ministry of Supply and administratively responsible for the development and production of aircraft, was to give some details of how the "super priority" scheme is to function in the aircraft industry.

The aircraft selected to carry the highest priority are the Hunter and Swift day fighters, the Canberra and Valiant bombers, one or other of the two night fighters, the D.H.110 and G.A.5., and the anti-submarine Gannet. In addition to these aircraft, guided weapons, the radar control and reporting system, Centurion tanks and 20 mm ammunition have been accorded the same degree of priority. These products take precedence over all other work, whether for defence, export or home production, but it is hoped that there will be the minimum of interference with exports.

The system as applied to the aircraft industry is quite simple in operation and entails the main contractors quoting the contract number for materials or components, marking the order "super priority" and attaching a copy of the Minister's letter. Ministry of Supply regional offices will also carry copies of the letter for verification. Sub-contractors will take the same action when dealing with their suppliers. According to the official statement: "Trade associations principally concerned are being informed of the significance of the scheme, the principal effect of which will be to secure that priority in the shop floor is given for requirements for these items by anyone to whom the words super priority are quoted."

Super priority can also be applied to expedite buildings and the supply of building materials and plant, and any difficulties can be reported to the Ministry of Supply, who will investigate them. It is intended that regional controllers shall make periodic spot checks on how the system is working.

Manufacturers are to be requested to use their super priority with the greatest discretion, and orders must not be requested either earlier or be made for greater quantities than are immediately required.

Coastal Command not an "Unwanted Child"

WHAT might appropriately be termed a sub-section of last week's Air Estimates Debate in the Commons (reported on pages 346-348 of this issue) was devoted entirely to the perennial subject of the future of Coastal Command *vis-à-vis* the Admiralty and the R.A.F. Most of the old arguments were advanced on both sides, with a few new ones.

Among those who favoured Admiralty control was Mr. Charles Fletcher-Cooke (Con., Darwen), who moved an amendment calling on the Government to institute an impartial inquiry into the working of Coastal Command. He submitted that any neglect, if neglect there be, was more likely to continue if the Command remained under the Air Ministry than if it were transferred.

A. Cdre. Harvey (Con., Macclesfield) was one of the members ranged on the R.A.F. side; he thought present circumstances inappropriate for "turning Coastal Command upside-down" by the kind of inquiry suggested. His own view was that the three Services should be completely integrated.

Among new suggestions was one by Mr. John Grimston (Con., St. Albans), himself an ex-Coastal pilot: He wanted to see the introduction of a piston-engined aircraft, of enormous range and internal capacity, and fairly simply equipped and cheap to produce, which could serve both Coastal and Transport Commands.

Mr. Nigel Birch, Parliamentary Secretary to the Ministry of Defence, emphasised in replying to this debate that Coastal Command was not an ill-fed and unwanted child of the Air Ministry. It was certainly true that Coastal Command ran down—but so did the other Commands. He agreed that Coastal was vital, but the air defence of Great Britain was equally vital; therefore, it was a matter for the correct allocation of our resources, and that responsibility rested with the Government.

Recalling the war-time arrangement whereby the operational policy of the Command was governed by the Admiralty in conjunction with the A.O.C.-in-C., Mr. Birch dealt with the administrative aspect of existing arrangements. The Navy, at present, flew light ship-borne aircraft and not heavy aircraft. Within the Air Force there were not only heavy aircraft in Coastal Command, but heavy aircraft in Bomber and Transport Commands. It was far easier to switch a trained crew who had worked with heavy aircraft than it was to re-train and to switch those who had worked only with light aircraft.

There must be an enormous backstage organization if heavy aircraft were to be kept flying. The R.A.F. had the machinery for maintaining these aircraft, training men to maintain them, and others to fly them. In the Navy there was no equivalent organization; and he could not think that it would really make either for economy or flexibility to set anything up of that kind.

Mr. Charles Fletcher-Cooke's amendment was withdrawn.

Comets in Service—May 2nd

MAY 2nd is to be the great day foreshadowed more than 2½ years ago (on July 27th, 1949) when the prototype de Havilland Comet took off on its maiden flight. Last Tuesday, B.O.A.C. confirmed that one of their Comets would inaugurate the world's first regular pure-jet passenger service on the route from London to Johannesburg on this first Friday in May. The return service will be flown on the following Monday, May 5th, and for a start a weekly frequency will be maintained. As more aircraft become available, the piston-engined Hermes now operating thrice-weekly on this route will be progressively withdrawn, and it is expected that by June three out-and-return Comet services will be operated each week.

Speaking of the Comet and this "memorable and historic event," Sir Miles Thomas, chairman of B.O.A.C. said: "A superb product of British invention, enterprise and skill, this remarkable aircraft . . . marks a new era in aviation history and will, in effect, halve the size of the world." He added: "B.O.A.C. is indeed proud to be the first operator in the world to fly a jet-propelled airliner."

The first scheduled flight is to be made via the airports named in the provisional schedule below, but the call at Beirut is still subject to approval of the Lebanese authorities. The elapsed time will be 23 hr 40 min on the outward journey, and 23 hr 55 min on the homeward flight to London; flying times will be 18 hr 40 min and 18 hr 55 min respectively. With experience, formalities at transit points will be accelerated and the journey time should be reduced. It is also the intention eventually to route the Comets through Cairo instead of Beirut, thus reducing the total distance by 450 miles. The take-off from London Airport will be at 1400 hr G.M.T., and the total distance to Johannesburg is 6,724 miles.

At the time of writing, no decision has been taken as to which Comet will fly the inaugural service, or which Comet crew will have the honour of taking it. The flight crew will, however, comprise captain, first officer, engineer officer and radio officer,

WHERE WILL HE WEAR THE U.S. INSIGNIA? Early models of the Hoppi-Copter—which aroused great interest when demonstrated in England in 1948—were fitted with a seat and landing gear. Now, Hoppi-Copter, Inc., of Seattle, appear to have reverted to the "strap-on" principle used on their early prototype of 1945. The latest version, shown here, is under development for strictly military, or naval, purposes.

COMING EVENTS . . . The appointment—announced this week—of Mr. G. C. I. Gardiner (left) and Mr. R. E. Bishop, C.B.E., F.R.Ae.S., to the board of de Havilland Propellers, Ltd., will give the firm a closer technical link with the parent company, of which Mr. Bishop is a director and chief designer, and Mr. Gardiner chief engineer. A development in the associate company's field of activity is reported on page 360.

and the cabin crew will consist of a steward and a stewardess. The machine will be a standard 36-seater, carrying, in addition, mail and cargo, all without surcharge, i.e., at normal fares and costs. (Current fares are £175 single; £315 return.) The 8-passenger forward cabin and the 28-passenger main cabin are fitted with "slumber-seats."

Nine Series 1 or 1A Comets, with de Havilland Ghost turbojets, and eleven Avon-Comets are at present on order for B.O.A.C. The Series 1s on the opening services will have a maximum take-off weight of 105,000 lb, and will cruise at a little under 500 m.p.h. at between 35,000 and 40,000ft. B.O.A.C. quote the maximum still-air range as 3,860 miles, and the practical stage length as 2,140 miles. Later this year it is planned to introduce Ghost-Comets on the London-Singapore service, and some two years from now it is hoped to operate Avon-Comets on B.O.A.C. North Atlantic and other routes.

PROVISIONAL SCHEDULE FOR INITIAL COMET SERVICES

	G.M.T.	Local Time		G.M.T.	Local Time
London	Dep. 1400	1500	Johannesburg...	Dep. 0700	0900
Rome	Arr. 1635	1735	Livingstone ...	Arr. 0855	1055
Rome	Dep. 1735	1835	Livingstone ...	Dep. 0955	1155
Beirut	Arr. 2110	2310	Entebbe ...	Arr. 1325	1625
Beirut	Dep. 2210	0010	Entebbe ...	Dep. 1425	1725
Khartoum ...	Arr. 0155	0355	Khartoum ...	Arr. 1725	1925
Khartoum ...	Dep. 0255	0455	Khartoum ...	Dep. 1825	2025
Entebbe ...	Arr. 0600	0900	Beirut	Arr. 2210	0010
Entebbe ...	Dep. 0700	1000	Beirut	Dep. 2310	0110
Livingstone ...	Arr. 1045	1245	Rome	Arr. 0310	0410
Livingstone ...	Dep. 1145	1345	Rome	Dep. 0410	0510
Johannesburg ...	Arr. 1340	1540	London ...	Arr. 0655	0755

Canadair Senior Appointments

A MONTREAL report says that Mr. John Jay Hopkins, president and chairman of the board of the Electric Boat Co., has been appointed chairman and managing director of Canadair Ltd., of which he has been president. Mr. J. G. Notman has been named president and general manager of Canadair, of which he has been vice-president and general manager since March, 1950.

Admiral L. B. Richardson has been appointed Canadair vice-chairman, and senior vice-president of Electric Boat Co.

S.A.E. National Aeronautic Meeting

NEARLY a score of papers will be read at the Society of Automotive Engineers' National Aeronautic Meeting at Hotel Statler, New York, from April 21st to 24th. On the final day, a display of equipment, and flight demonstrations, will take place at Idlewild Airport.

H.R.H. Prince Bernhard of the Netherlands is to speak at the dinner held in connection with the meeting: his subject will be "The Importance of Europe in the Co-operation of the Atlantic Countries with Respect to Aviation."

Three British visitors will read papers—Mr. S. Scott-Hall, Ministry of Supply ("Government Collaboration in Aircraft Development"), A. Cdre. G. J. Powell of Silver City Airways ("Operation of the English Channel Air Ferry") and Mr. R. C. Morgan of B.E.A. ("Introduction of New Transport Aircraft"). A British documentary film of the 1951 Farnborough Flying Display is also to be shown.

Titles and authors of the S.A.E. papers dealing with commercial-aviation subjects are listed on page 362 of this issue. Others to be given at the New York meeting are :—

Application of Titanium to Aircraft Engines (H. H. Hanink, Curtiss-Wright); High-altitude B-36 Cabin-pressurization Operating Experiences (W. C. Dietz, Consolidated Vultee); Equipment for Testing High-speed Aircraft (Col. S. J. Holtoner and Col. F. J. Ascani, Edwards Air Force Base); Flight-test Facilities for Naval Aircraft (Rear-Admiral W. V. Davis, Jnr., Patuxent); Economics of New Aircraft Selection (A. O. Baltensweiler and W. Guildmann); Mechanical Engineering Applied to Electronic Fuel-control Design (T. P. Farkas, J. A. Osterman and S. G. Best, Hamilton Standard Division of United Aircraft) and A New Technique for Investigating Compresser-stall and Other Transient Characteristics (W. J. Kunz, Bendix Aviation).

Parachute Research Unit

IN order that its work in the field of parachute design and manufacture may keep pace with the solution of new problems raised by high-altitude and supersonic flight, the Irving Air Chute of Great Britain, Ltd., has formed a research and development department. Its director will be Mr. W. D. Brown, M.Sc., A.M.I.Mech.E., who will have as his principal assistants Mr. S. B. Jackson, B.Sc., A.I.Ph., and Mr. J. E. Hatfield, A.M.I.Med.E.

Mr. W. D. Brown is now resigning from his post as a principal scientific officer in the Ministry of Supply in order to take up his new duties in June. He was responsible for the formation in 1942 of an M.o.S. section devoted solely to parachute research and development and has remained its head up to the present date. He is a leading authority on parachute design and use, his work having covered every phase of the subject—which nowadays, of course, includes not only aircrew equipment but parachutes for dropping troops, supplies, vehicles, guns and boats, together with those developed for special applications in aircraft, e.g., braking and anti-spinning. Mr. Brown's book *Parachutes*, published last autumn, has already become a standard work on the subject.

Mr. S. B. Jackson, who was for several years deputy head of the M.o.S. Parachute Section, has for the last three years been a senior scientific officer in the Australian Ministry of Supply. He is an experienced aerodynamicist.

Mr. Hatfield was for a number of years chief inspector of the Irving Co. and during the past two years has been its chief engineer. He has been responsible for many new developments, including the company's automatic parachute release, which has recently been put into production and will shortly be in Service use.

Sincere Effort

LAST week we published two "stills" from the film *Angels One Five*, which had its world première at the Empire Theatre, Leicester Square, on March 19th. We awaited with particular interest the considered pronouncements of the film critics of the daily Press, for we realized that their viewpoint would be very different from ours: whilst the technicalities of film production are not our *métier*, aviation and the subject-matter of the film are. The opposite is true of the professional film critic. Nevertheless, the many thousands of people who were associated with Fighter Command during the war, and the many more who are now in the Service or are concerned in some other way with flying, will, like us, make a point of studying the aviation technicalities when the film comes their way.

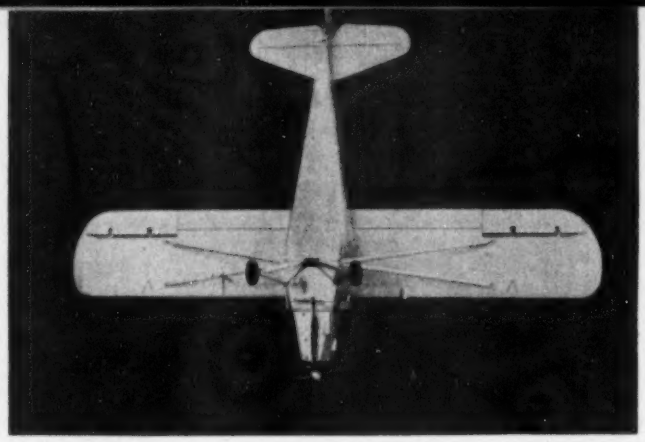
Parts of *Angels One Five* are handled with an admirable sense of atmosphere, but some indication of the seriousness with which the pilots regarded their jobs would, we felt, have balanced their irrepressible high spirits. A delightful comedy touch is provided by the Army sergeant-major lecturing his men on their behaviour while guarding the station; but is it really essential that R.A.F. ground personnel should invariably be portrayed in fictional films as comic near-cretins?

While we admired some excellent Hurricane shots, the standard of technical accuracy is not high and, for us the film came near to being ruined by the ludicrously phoney shots of German bomber formations; but this, it seems, did not disturb the professional film-tasters. We entirely agree with one critic's opinion that the flashing on the screen of excerpts from Mr. Churchill's famous speech might well have been omitted. It is becoming an overworked trick. We print below extracts from two reviews:—

". . . no film which has as its subject the Battle of Britain as it was fought out in the late summer of that baleful, magnificent year could possibly fail in interest and emotion. . . . Whether or not the atmosphere is precisely right or subtly distorted only one of the few themselves could say, but certainly the air of boisterous physical high spirits, the slang, the comradeship, and the jokes carries its own conviction. . . . Mr. Jack Hawkins, as the station commander, shows the greatest thrust and authority in acting. . . . Miss Dulcie Gray hovers on the edge of the airfield«, and the film, oozing sweetness and charm." (*The Times.*)

Perhaps the best summing-up, however, is provided by the *Evening Standard's* Milton Shulman when he says: "*Angels One Five* is a minor but sincere effort, whose simple virtues are particularly gratifying after the spate of raucous, psychosis-ridden war films that have been coming to us from Hollywood."

HERE AND THERE



BOTTOMS UP: Although most Austers are regarded as non-aerobatic, the clipped-wing Aiglet Trainer (Gipsy Major) is an exception. Last week we photographed this unusual piece of inverted flying from the rear-doorless Ambulance/Freighter; Ranald Porteous was the Aiglet pilot.

Valiant No. 2

MR. GEORGE EDWARDS, chief designer of Vickers-Armstrongs, Ltd., announces that the second prototype of the Vickers Valiant jet bomber will probably fly during the first week of April.

The 1,000th Enemy

IN Tokio last week the Far East Air Force claimed that, since the Korean war started, their pilots had destroyed 394 Communist aircraft, probably destroyed 107, damaged 473 and possibly damaged six. Results of several battles on March 20th brought the total to almost exactly 1,000.

Queer Bird in Korea

AN American Sabre pilot reports an encounter with a new high-wing fighter which, according to his reckoning, is about 2ft longer and 2ft broader in span than the Mig-15. It appeared, he said, to be more efficient at low altitude than the standard Mig, but about 50 m.p.h. slower.

No Place to Hide

ALMOST every day civilians line the fence of the Boeing airfield at Seattle to goggle at the huge XB-52 jet bomber prototype on its taxying trials. The machine is still regarded as more or less secret, and only one photograph (as printed in *Flight* of January 11th last) has been released. The eight Pratt and Whitney J-57s are said to start with a belch of black smoke and flame, and the bomber lumbers along the concrete runway and quickly overtakes two station wagons which race ahead to photograph the action of its undercarriage. Already it has broken up the 7-in-thick concrete runway. At the conclusion of each taxying run a parachute billows from the tail and the wheel brakes can be heard screeching from half a mile away.

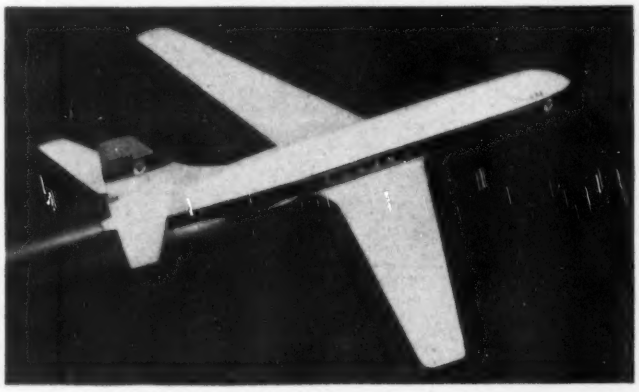
THE INSTRUMENTS OF AIR POWER

NEXT WEEK'S issue of *Flight*—dated Friday, April 4th—will be a greatly enlarged number containing a survey of MILITARY AIRCRAFT OF THE WORLD. Profusely illustrated, much of it in photogravure, this review will cover the whole range of military types of the nations, and will give all the noteworthy facts about their equipment that are known or are permitted to be published. Other features will include plan-view drawings of 14 experimental and production single-seat fighters. Readers who wish to make sure of getting this issue—valuable as a work of reference—should order from their newsagents.

More Powerful Sabres

MR. R. GILPATRIC, Under-Secretary of the U.S.A.F., has announced that faster Sabre fighters will be coming off the production lines next month. They will be powered with General Electric J-47-27 turbojets in place of earlier marks of the J-47, and will be fitted with "more powerful guns or rockets" than those now in use. Mr. Gilpatric added that production of aircraft for the U.S.A.F. and Army was expected to reach a peak of about 900 a month by the middle of this year. No fighters were expected to be equipped with guided missiles until next year at the earliest.

NEW FORMULA in power-plant location is manifest in this design-study for a medium-range jet transport by the French S.N.C.A.S.E. group. The three turbojets—two on the fuselage sides and one in the tail—are Atars.



R.C.A.F. Packets

DELIVERY from the United States of the first Fairchild C-119 Military Packet for the Royal Canadian Air Force is expected next month. Plans to purchase C-119s were made towards the end of last year.

Arming Yugoslavia

FROM Belgrade a special correspondent of the *Daily Telegraph* reports that between 200 and 300 piston-engined fighters are believed to be on their way to Yugoslavia from the West. All should have arrived before the summer is out and nearly half will be British.

Finalized Mistrale

THE first S.N.C.A.S.E. Mistrale (Nene-Vampire development) to be fitted with an ejection seat flew for the first time on February 25th. As far as is known, this is the first Vampire development to be so equipped; powered by a Hispano Nene, the type is in fairly large-scale production.

Sailplane's 44,000ft

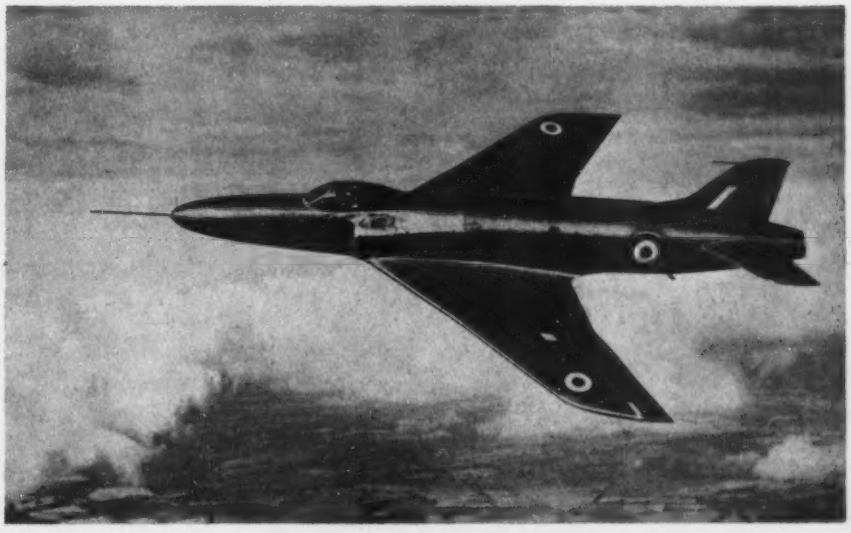
FLYING above the Sierra Nevada range in a two-seater sailplane last week, two members of the Southern California Soaring Association claimed to have reached 44,000ft: the figure is being put forward as a record. The present F.A.I. altitude records for sailplanes stand at 42,100ft (single-seater) and 38,220 (two-seater).

Australian Napalm Rocket

THE R.A.A.F. Meteors now operating in Korea are using "flaming onions"—rockets which deliver napalm incendiary material instead of explosive. The new weapon, which was first used on February 8th, is an R.A.A.F. invention and is made by the Service itself. It was designed by F L. John C. Smith, a squadron armament officer who recognized that the napalm "bomb" had certain limitations and that a more accurate method of delivering napalm was required. The first "flaming onion"

PROGRESS

Rolls-Royce produce turbo-jet,
propeller-turbine and piston aero engines to suit
all types of medium and high-powered aircraft



THE VICKERS SUPERMARINE "SWIFT" FIGHTER
powered by the Rolls-Royce "Avon" turbo-jet engine

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Impressions of modern aircraft

THE AVRO 707 DELTA

Equipped with Lockheed shock-absorber legs.

ALL-BRITISH Lockheed

AUTOMOTIVE PRODUCTS COMPANY LTD., LEAMINGTON SPA, ENGLAND.

HERE AND THERE . . .

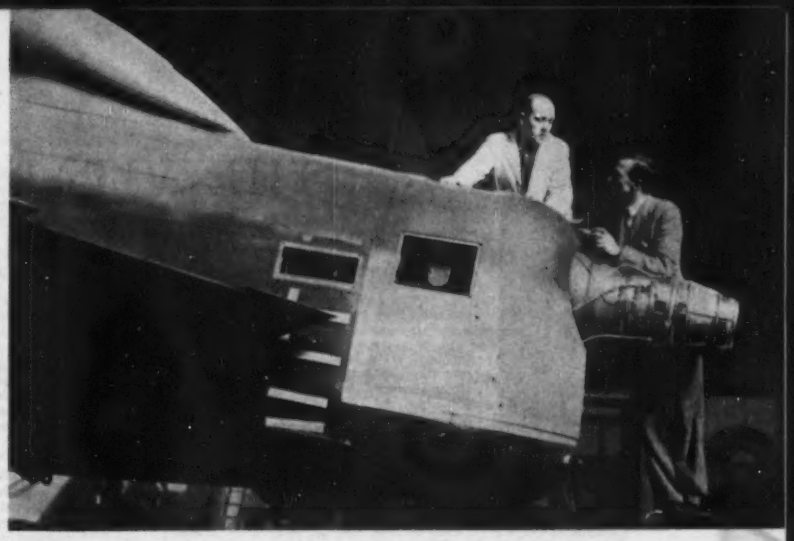
was tested at Wiliamstown, New South Wales, eighteen months ago. It is learned incidentally, that No. 77 Squadron, R.A.A.F., has now flown more than 4,000 sorties in its Meteor 8s against the Communists. During February 1,005 sorties were chalked up and the month ended with 52 effective sorties in one day. The Meteors have been patrolling or strafing from first light to dusk.

Time-saver

ON his way to make further tests of the B.R.M. at Monza recently, racing driver Stirling Moss crossed to France by the Silver City air ferry, taking his Jaguar XK 120 with him. He has expressed his intention of using the ferry to transport his racing cars throughout the season.

At the Royal Tournament

R.A.F. contributions to this year's Royal Tournament at Earls Court (June 4th-21st), are three in number: Illuminated-club swinging (R.A.F. Station Bridgnorth); drill display with band (Catterick); and a police-dog display (Provost Branch, Netheravon). Airmen (from Cosford) will also take part in the combined Services physical-training display.



THE STING IN THE TAIL: First view of the experimental installation of an Armstrong Siddeley Adder turbojet in the tail of a Lancaster flying test-bed. The intake fairing is seen on top of the fuselage at the left of the picture. Static thrust of the Adder is 1,100 lb.

Wild Goose Chase

ACCORDING to a story from Korea, Allied A.A. defences were alerted, and fighters scrambled, when radar screens showed a large, unidentified formation to be heading towards Inchon shortly before dawn. Plotting-tables soon showed one puzzling feature—that the speed of approach was only about 85 m.p.h. The mystery was explained when the searchlights were exposed—to reveal a large flock of snow-geese. The speed quoted, incidentally, suggests that the birds must have had a fairly useful tail-wind.

Acclimatization

AN Australian grazier has built a full-scale mock-up of a B.O.A.C. York in order to "train" a flock of 100 valuable stud sheep for a forthcoming flight to Israel. Daily he herds the animals into pens in the fuselage—but whether he has also arranged to simulate the noise of four Merlins is not stated in the Melbourne news-story.

SWISS MAP-MAKERS' CHOICE: The Swiss Government Survey Service recently took delivery of a Percival Survey Prince. Seen here are (left to right): Messrs. C. Wipfli, who flew the aircraft (HB-HOF) from Luton to Zurich; U. Frischnecht, survey-office photographer; E. Tanner, of the Service Technique Militaire (Aviation); and Meier, ground engineer.

IN BRIEF

MR. S. G. JARVIS has been appointed secretary of C. C. Wakefield and Co., Ltd., makers of "Castrol" oils. This follows the recent announcement that Mr. L. M. Broadway, formerly director and secretary, had been appointed an assistant managing director. Mr. Jarvis joined the firm in 1925.

* * *

Mr. W. C. Shelton has retired from the position of senior sales and technical representative of the Hoyt Metal Co. of Great Britain, Ltd., after 36 years' service.

* * *

Titanine, Ltd., aircraft-finish specialists, report a profit (after charges but before taxation) of £70,679 for the nine months ended December 31st last. A final dividend of 10 per cent (making a total of 30 per cent) is declared.

* * *

Mr. E. K. Cole left recently by air for Bombay to open a sales-conference of Ekco dealers there. He is also conferring with Indian principals of National-Ekco Radio and Engineering Co., Ltd., on future needs in the territory.

* * *

Cdr. F. Stiernon, a retired officer of the Belgian Air Force, has joined the staff of Intair, whose African organization is being considerably expanded as a result of increased business in the Belgian Congo. The company, with offices in Antwerp and Leopoldville, represents a number of British and other aviation firms in Africa.

* * *

Ransome and Marles Bearing Co., Ltd., Newark-on-Trent, have recently opened a new Midlands office at 291-295 Corporation Street, Birmingham. The single-storey building is designed for ultimate extension to four floors when building restrictions are relaxed. Mr. J. C. Bayley continues as the company's Midland area manager.

* * *

The Spitfire Mitchell Memorial Scholarships tenable at University College, Southampton, on this year's examination have been awarded to J. Binder, an apprentice at the Gloster Aircraft Co., Ltd., and T. W. F. Moore, apprenticed at the Bristol Aeroplane Co. College Open Industrial Scholarships were awarded to R. J. P. Arnold and N. T. Green, both of Saunders-Roe, Ltd.

Mr. G. R. Ward, the recently appointed Under-Secretary of State for Air, who introduced the 1952-1953 Estimates.*

THE VITAL NEED

—*for an All-out Aircraft-production Drive: Commons Debate*

THE Air Estimates for 1952-53 (see "Flight," March 7th) first provided for a net total of £467,640,000. A revised Estimate has since been presented to cover an addition of £30,000,000 to appropriations in aid—our estimated share of the grant of economic aid by the United States. Taking into account the recent Supplementary Estimate, this is a net increase of just over £107,000,000 on the 1951-52 figures. In gross totals, the Government expect to spend £147,000,000 more in the coming year than was provided for the present financial year.

EMPHASIS on the need for "a tremendous productive effort" was perhaps the dominant feature of the debate on the Air Estimates, which were introduced to the Commons on March 18th by Mr. George Ward, the Under-Secretary for Air. Mr. Ward, who was widely complimented for his successful performance at the dispatch box after a very brief term in office, based his remarks on an outline of the past, present, and future of the Royal Air Force.

At the outset he said he did not seek to apportion praise or blame for what had happened regarding the post-war Royal Air Force, whose rundown was originally planned to end with a front line large enough to meet normal peace-time commitments in a period free of international tension. That front line had been determined—because of demobilization and a regular strength of only 38,000—not by the number of aircraft but by the number of trained men available. The consequence was that at one stage the front line had sunk to little over 1,000 aircraft, and any expansion was governed by the manpower situation. At the same time, re-equipment was planned on a long-term basis—a policy which no doubt relied at that time (1946-1947) on the belief that the need for up-to-date replacement aircraft lay seven or eight years ahead.

The inevitable result was a consequent rundown of the aircraft industry, which exceeded the R.A.F. in manpower. No increase in the numbers employed in industry took place until June 1950. It was this rundown in the aircraft industry which made it so difficult to accelerate production today.

Mr. Ward then outlined the factors which had affected production in recent years. Emergency measures arising from the 1948 Berlin crisis had been followed by the 1949 financial crisis—resulting in a reduction of Transport Command but a slight expansion in Fighter Command, during which the Venom, Meteor N.F.11, and Canberra were ordered, and some B-29 Washingtons were secured from America.

Then came the invasion of South Korea, a change in Government policy, and the announcement of the £3,600,000,000 defence programme by the end of 1950—a programme designed on the basis of three years' maximum production of armaments *without* special measures being taken. This plan had resulted in the ordering of more Canberras, plus the Valiant, Swift, and the Hawker Hunter (P.1067).

Finally, the Government announced the £4,700,000,000 armament programme following China's intervention in the Korean War. On this occasion, it was decided that special measures *would* be taken to secure the maximum possible availability of materials and labour to the aircraft industry. But, said Mr. Ward, little or no progress was made in 1951 towards that end.

The result was that the capacity of industry had been overloaded, and the programme was running behind the planned level. Steps had been taken in recent months to remedy this position. The Minister of Supply was endeavouring, in co-operation with industry, to stimulate aircraft construction. The Minister of Labour was doing everything possible to expand the labour force through the Notification of Engagements Order; and the Prime Minister's announcement of a super-priority for the newest types of aircraft would enable speedy action to be taken to overcome delays due to shortages of machine tools, materials, and components. (In this connection, Mr. Ward said that the Minister of Supply would shortly be meeting representatives of industry to inform them of the detailed administrative arrangements for putting this super-priority into effect.)

Mr. Ward then enumerated the four-fold task that lay ahead:—

(1) To increase the delivery rate of modern aircraft for the R.A.F.
(2) To increase both ground and aircrew personnel.
(3) To increase the regular content of the R.A.F.
(4) To provide the training organization, airfields, maintenance depots, and accommodation necessary to a large, complex, and efficient force.

This expansion inevitably placed the heaviest burdens on the training organization, a significant proportion of the total uniformed force being used on instructor duties or as pupils.

The Under-Secretary then turned to the strategic aspect, commenting that the vast importance of air power—demonstrated in the last war—was today decisive. But he thought there was a danger that false lessons might be drawn from events in Korea, where, although the U.N. air forces had shown great stopping ability, air power had not been deployed as it would in a major war. Further, our own experience of the effects of hostile air power in the last war had been insignificant compared with the enemy's. Our armies on the Continent in 1944 and 1945 enjoyed massive air superiority, and our ports, communications, and industries were not subjected to one-tenth the weight of the attacks on Germany.

"If our preparations in 1944 had suffered the disruption inflicted on the enemy's," said Mr. Ward, "'Overlord' would certainly never have been mounted." He added that the advent of the atomic bomb clearly multiplied the effectiveness of air power many times over. This development had guided the minds of the late and present Governments in planning a large expansion of the Royal Air Force both for offence and defence.

These general comments brought the Under-Secretary to consideration of the manpower position in the R.A.F. Nineteen-fifty-one had been the best recruiting year since the war. Entries of aircraft apprentices at Halton and the Radio School at Cranwell had totalled 928 against 551 the year before. In ground trades, 45,000 regular airmen and airwomen were recruited, compared with 25,000 in 1950, while aircrew recruitment was three times the 1950 total. Mr. Ward thought this improvement attributable to the better pay scales announced in 1950; the "popular" three- and four-year regular engagements; and the new trade structure with its promise of a service career up to the age of 55 in technician as well as N.C.O. grades.

He also mentioned the recruitment scheme for men of 17½ years for three or four years regular engagements in ground trades, in addition to the longer 5-, 10-, and 12-year engagements. In aircrew big factors had been the four-year engagements in addition to the normal period of eight years, and the scheme whereby all pilot and navigator trainees were granted probationary commissioned rank. Apart from these material incentives, said Mr. Ward, it should not be forgotten that many men joined because they counted it an honour to be in so great a service.

Mr. Ward added that the slight drop in recruitment during the last few months need not give great cause for alarm. It was only to be expected that late in 1950 and early in 1951, when the improved conditions of service were introduced, there should have been a boost in numbers which could not be constantly maintained at the same high level. Nevertheless, there was still a shortage of experienced airmen and N.C.O.s in certain highly skilled trades, particularly in radio servicing. An attempt was being made to meet this difficulty by narrower specializations which enabled a man to do servicing tasks after a shorter period of training; but it would take time to rectify matters.

Dealing with aircrew training, Mr. Ward stressed that the R.A.F. must plan not only for new squadrons but for the thorough training of the extra aircrews who went to the squadrons. As it took nearly two years to train a pilot to full efficiency, this meant that trained instructors, aircraft, and other valuable resources had to be "ploughed back" for the time being in order to produce a larger force of the necessary quality. This training was also expensive in works services, particularly with the introduction of jet aircraft.

* *Mr. Ward is an ex-Regular officer who left the R.A.F. with the rank of group captain. He is Conservative M.P. for Worcester.*

In 1950 the then Government had taken immediate action to increase training facilities as a consequence of the rearmament programme, and this had resulted in the training expansion being now well under way. During the coming year, about 3,000 fully trained aircrew would be turned out—nearly twice the 1951 figure. "Very much higher" results were expected during 1953 as a result of the opening of still more schools.

"This I regard as solid progress," commented Mr. Ward. Paying tribute to the very high standards maintained by the Training Commands of the Royal Air Force, he noted the considerable help received from Canada in the training of aircrew—it was hoped to increase this effort in conjunction with N.A.T.O.—and said that similar facilities would be provided in America.

Recruitment for the volunteer forces had not been so good, but the A.T.C. and the Combined Cadet Force were in fine heart and working hard. It had been decided to increase the number of flying scholarships for air cadets from 300 to 500 during this year.

Summing up, Mr. Ward said the outlook on the personnel side was "reasonably encouraging," but the equipment situation was not so happy.

Referring to the extremely difficult decision as to when to go into production on new aircraft, Mr. Ward mentioned the S.B.A.C. Show, where the two main impressions were, one, the importance of the jump forward from existing types of Service aircraft to the swept-wing and delta-wing types; and, two, the evidence that there was a foundation for our belief that we now had prototypes of sufficiently high quality and performance eventually to regain the lead which we lost temporarily both to the Americans and the Russians.

Mr. Ward then emphasized that these new fighters were only prototypes. "I do not want to create undue anxiety," he said, "but it would be quite wrong for me not to make it plain that the air defences of this island at the present time would be woefully inadequate if we had not powerful allies in the North Atlantic Treaty Organization."

Mr. Ward stressed that this inadequacy—"a matter of life or death for every one of us in this country"—was not merely a matter of numerical strength, as compared with the Soviet Air Force, but of aircraft performance. There was today no fighter in service to match the Mig-15, and it would be some time before we began to re-equip squadrons with our own latest types.

The hard fact was that we had temporarily lost the lead, and could not regain it for some time to come. What was wanted throughout the aircraft industry today was the same spirit that had prevailed in war-time. There must be a tremendous productive effort which, said Mr. Ward, he was convinced could be achieved, but only if everyone concerned was really aware of the need.

"It is for this reason," he added, "that I have been frank in describing the present shortcomings of the R.A.F."

The Under-Secretary went on to deal with the vitally important rôle of the Control and Reporting Organization. This was being rebuilt following the post-war rundown, but it was no easy business and was not going ahead as fast as was wished. Modern techniques, and particularly the greatly increased performance of potential enemy aircraft, meant radical and expensive changes in equipment. Moreover, the re-establishment of the system on a modern basis involved demands on material and labour which were difficult to meet, and conflicted with many important civilian requirements in such fields as steel, telecommunications, and electronics. Also, many of the stations were in remote places where labour was scarce.

Dealing with economy, Mr. Ward said that the Government intended to cut out all inessential demands on manpower and materials. It was also intended to refrain from ordering types of aircraft which, though highly desirable, were not vital to defence.

Economy in the Royal Air Force would be enforced wherever possible, short of causing loss of operational efficiency, to pare and prune expenditure. Every means would be sought to keep agricultural land open to farmers, and to make the smallest possible demands on building labour and materials. This policy had already led to the reduction of hard-standings and concrete aprons on airfields, and to economies in the method of installing airfield lighting—a source of "considerable financial saving."

All possible expedients were being used to avoid having to spend large sums of money and to use large quantities of steel on building new storage accommodation. A careful check would be kept on Service accommodation, but it was intended to press on with the provision of more married quarters.

Mr. Ward then turned to the question of the operational commands. The main effort was being made in Fighter Command, and would continue until the Swift and Hunter were available. When the expansion was completed, the R.A.F. would have a larger fighter force than in 1939, and while the increase in the home-based fighter force was being carried out with existing types it would add very considerably to the security of this country.

Day fighters at present in use were still capable of intercepting and shooting down any type of enemy bomber likely to be employed, but our inferiority was likely to be apparent in a fighter *v.* fighter battle. This fact made the presence of Canadian and American Sabre squadrons specially acceptable.

Considerable progress had been made in the expansion and re-equipment of the night-fighter force, and all squadrons now had jet aircraft. The expansion rate would increase and the Venom would secure an improvement in quality.

Mr. Ward here paid a tribute to all R.Aux.A.F. squadrons—now re-equipped with jets.

Dealing with Bomber Command, Mr. Ward said that while prohibitive costs prevented the building up of a force comparable with that during the last war, it was the Government's aim to achieve striking power with fewer aircraft by increasing the bomb load, by greater accuracy—which made development of new navigational and bomb-aiming devices doubly necessary—and by the use of more effective weapons. While the R.A.F. must at present rely on the Washington and Lincoln, essentially last war types, the appearance of the Valiant would produce a far more effective bomber force which, in conjunction with the U.S. bomber force, should fulfil all the tasks required of it.

Expansion of Bomber Command was at present confined to the Canberra, deliveries of which were not so rapid as had been hoped. Every effort was being made to speed things up. The Canberra would also be used for P.R. duties, as, possibly, would other types of jet aircraft. Expansion and re-equipment of Coastal Command was also going steadily ahead with Shackleton and, more recently, Neptune aircraft.

Mr. Ward here referred to 2nd T.A.F. in Germany, saying that its planned expansion was greater than that of any other single Command. The night-fighter force was being built up, and the Venom would be introduced into the fighter-bomber force.

It was intended to form a strong top-cover force of Sabre squadrons as soon as these aircraft were available from Canada, and steps were being taken to make 2nd T.A.F. mobile—"a big job which meant putting practically everything on wheels except the runways." While there would be no full integration in the European Defence community, but rather the closest liaison with it, it was hoped to bring about a situation where 2nd T.A.F. and the European Air Force could fight together with the greatest confidence and effectiveness.

Mr. Ward had a less cheerful report to give on the future of Transport Command, whose expansion, highly desirable as it was, could not be increased whilst the expansion of the other operational Commands was in progress. In case of emergency the considerable resources of civil aviation would be available.

Referring to future developments, Mr. Ward mentioned the development in Australia of guided missiles in their varied rôles of air-to-air, ground-to-air, air-to-ground, and ground-to-ground attack. Other objects of research included improvements in fighter armament, better detection of enemy aircraft at low heights, and radar and bombing aids for our bombers.

Lastly, there was the attempt to simplify the production and maintenance of all our equipment. The improved efficiency of the modern aircraft was of little use if the cost made it impossible to be produced in sufficient numbers, and the same consideration applied if maintenance of equipment was so heavy that no adequate use from it could be obtained, or such use could only be obtained by the inordinate use of manpower.

Simplification of requirements must thus be a basic element in technical development, for only by confining our demands to what was truly essential, and by the constant efforts of our scientific colleagues and technologists, could adequate air power be achieved within the possibilities of the country's economy.

Stressing the importance of efficiency in all branches of the Royal Air Force, and of unity and mutual support in the wider aspect of the Commonwealth and N.A.T.O. air forces, Mr. Ward ended: "The Royal Air Force has a vital and formidable task. But it will tackle that task with the same courage, determination, and devotion to duty with which it earned, so short a time ago, the admiration of the world."

THE DEBATE

Mr. Arthur Henderson (Lab., Rowley Regis and Tipton) drew attention to the Second Report of the Select Committee on Estimates, which stated that the lag in the production of fighters and heavier aircraft was anything from three to nine months. That was not contemplated when the late Government had made plans for marrying the number of fighters and bombers that were coming off the production line with the number of aircrew from the training schools. As there was no delay in the training of aircrew, he assumed the "obvious result" would be an unbalance of air strength. While agreeing that the sooner the F.3 and the Swift were got into production the better, he asserted that this need did not mean that we did not today possess an effective fighter force composed not only of Meteor 8s and Vampire 5s, but also of the American Sabre squadrons. Major Jabara, U.S.A.F., had said that Western Europe jet pilots could hold their own against Mig-15s. Therefore, while there was an intensive effort to speed up the production of more modern fighter aircraft, Mr. Henderson hoped nothing would be said or done to undermine the confidence of our pilots in their present machines.

His view was that the fundamental difficulty confronting this country

THE VITAL NEED . . .

in building up the Royal Air Force arose from the pressure for quantitative power in each branch. While there was general agreement on the need for a balanced Air Force, it was quite impracticable, he thought, to equip the R.A.F. with great numbers of modern machines in all four Commands out of the means available, or likely to be available. Britain's Air Force must be related to that of her N.A.T.O. partners. The target should be to have a fighter force adequate for U.K. defence, and to make an adequate contribution to the combined fighter forces of the Western Allies in Europe and elsewhere. Similarly, he thought the strength of Bomber Command should be related to American bomber strength; while the main responsibility for strategic bombing must rest with the U.S.A.F., Britain must build up a bomber striking force to co-operate with the American bomber force both for strategical and tactical purposes. He thought similar considerations should govern the building-up of Coastal and Transport Commands.

Mr. Henderson said the suggestion was new to him that there should be a very small bomber force, but capable of carrying a very heavy weight of bombs. If that were possible it would be one way of dealing with the problem of V.2 attack. Another remedy, he suggested, might be a simplified mass-produced jet bomber, produced at lower cost.

MR. W. R. D. PERKINS (Con., Stroud and Thornbury) put the view that, if war should come today, the R.A.F. would be unable to defend our country; he believed the reason for this was the reduction of the Estimates from £212 million in 1947 to £173 million in 1948. Dealing with Fighter Command, he emphasized that there was not one modern, swept-back wing fighter in service. All the aircraft in the Command today were not obsolete, but they were obsolescent in type and, worse still, there was no prospect of our getting swept-back machines into Fighter Command, without dollar purchases from America or Canada, for at least two years. He wondered if the Hunter and Swift would give the R.A.F. superiority over the Russian Air Force when they reached the squadrons in three years' time. Today the Mig-15 was finding its way into the Russian satellite air forces, and it was obvious that the Russians were beginning to regard the Mig-15 as a second-line aircraft. It was also obvious, he thought, that they had something better up their sleeves—something which would be produced in two or three years' time.

Commenting that our night-fighter squadrons were at present re-equipped with obsolescent Meteor 11s and Vampire 10s, he asked the Under-Secretary for Air when the De Havilland 110 or the Gloster G.A.5 were likely to appear. He suggested these aircraft were unlikely to go into the squadrons for at least three and probably even five years. He expressed similar views on Bomber Command, who might have two squadrons of Canberras, but not more. As far as he could see, the chance of the Valiant reaching squadrons in quantity must be four or five years ahead. Today Bomber Command was incapable of fulfilling its proper function of either acting as a deterrent to the enemy, or destroying the breeding-grounds where enemy bombers were made. Mr. Perkins also criticised the present state of Coastal Command, and suggested that that part of Coastal Command which was vital for the sinking of submarines should be taken away and given to the Admiralty.

MR. FRANK BESWICK (Lab., Uxbridge) stressed the need for a transport reserve in terms of hundreds, if not thousands, of aircraft. He believed that up to December of last year no fewer than 121,000 men had been flown half-way round the world from San Francisco to the Japanese and Korean theatres of war. That was the order of the military problem, and it might be that our own problems would be even bigger than that. Mr. Beswick thought added weight should also be given to the advantages of air trooping, partly because it was a better way of making the best possible use of the limited number of men available, and partly because it would yield a ready-made reserve in war-time.

Mr. Beswick's third point in favour of a stronger air-transport force was the tremendous export potential represented by current British types. (Here his argument was clearly based on an article in *Flight* of January 4th.) The Comet, he reminded the House, with a deadweight of approx. 50,000 lb, represented exports worth approximately £330,000, while a comparable weight of motor cars had an export value of between £10,000 and £15,000.

Summing up, Transport Command should be built up and priority given to the new machines for the Air Corporations. He thought our air freighter services should be developed, as well as a large organization, preferably publicly owned, specializing in air trooping. He deplored the slow progress on the Princess flying boat, which had been "martyred" by the manufacturers of aircraft engines, and thought that some priority should be given to the Protrus 3 engine.

LORD MALCOLM DOUGLAS-HAMILTON (Con., Inverness) said that while it was perfectly permissible to sell transport aircraft, he thought our latest-type engines and airframes were something which foreign powers should not get unless they were proved and reliable allies. He then suggested that even U.S. air power was not in such a happy condition as might be supposed, and quoted the Alsop brothers as stating last month that Soviet Russia was making six jet interceptors to every one American machine, and two jet bombers to every one made by the Americans. Migs were being turned out at 6,200 a year and twin-engined jet bombers at 750.

There was a great need for high-level machinery to decide policy between civil and military air transport. His own view was that the Royal Air Force could save money and gain manpower if civil operators were allowed to operate all the scheduled routes at present served by Transport Command. The activities of Transport Command should be confined to Army support—paratroop carrying, glider towing, and so on.

As regards private flying training, some positive encouragement should be given by the Air Ministry, in conjunction with the Chancellor of the Exchequer, to flying clubs—and to the private owner, who was in danger of becoming extinct.

SURGEON CDR. REGINALD BENNETT (Con., Gosport and Fareham) asked the Under-Secretary for Air if some further description could be given of the term "super-priority", particularly as to whether it applied to fighters only, or to bombers as well. Cdr. Bennett then made the interesting point, in reference to the building of runways, that there was a strong case for the use of assisted take-off and arrester-gear equipment on land. He suggested that there could be mobile landing and accelerating units which could be anchored in place, using stretches of road.

W/C. P. B. LUCAS (Con., Brentford and Chiswick) wondered how, in two or three years' time, the Hunter and Swift aircraft would compare with the later marks of the Mig-15, or any other fighter of advanced design attributed to Lavochkin and Yakovlev, and no doubt aided by German inventive genius. It could be presumed that the Russians had had invaluable opportunities—in the air fighting immediately south of, and high above, the Yalu River—of sizing up the qualities of the Mig-15. Were any attempts being made in Fighter Command today, he asked, to give live firing practice to pilots under modern operational conditions such as existed in the Korea theatre?

It seemed to him an interesting commentary that in the new and modernized conception of air fighting which had arisen from experience in Korea, the Americans had found that, as a rule, the best age for a pilot was around 30. Certainly it was true that the average age of pilots of some of the F-86 Sabre squadrons was around 28 or 29—very different from the age of 21 and 22 as we had now come to recognize. At the older ages, he thought, pilots had learned to shoot, and were more "solid" in the air than their younger, less experienced comrades who had seen nothing of the fighting in the European conflict.

Dealing with flying training, W/C. Lucas said that while he did not think there would ever be any real substitute for actual flying time in an aircraft, there was much to be said for flight simulators. He suggested that the device afforded a very considerable economy, and was glad to know that B.O.A.C. had a Stratocruiser simulator in operation, and one for the Comet on the way, while the C-in-C, Bomber Command, had signified his desire for a Valiant simulator. He wondered if it would now be possible to introduce the simulators into Fighter Command, if not for the new, swept-wing fighters, then for the new all-weather fighters. Dealing with actual flight training, W/C. Lucas said that more training ought to be transferred to the North American Continent and to the Caribbean, where weather conditions did not put such a heavy responsibility on both pupil and instructor.

MR. JOHN PROFUMO (Con., Stratford) pointed to the dangers of leaving the provision of transport services to the U.S., a policy which would give them an immense advantage over us in the field of civil aviation. This was not merely a question of the transport of supplies, but, even more important, the development of striking power based on high mobility. There had been an example during the Korean campaign. The 15th U.S. Strategic Air Force of 1,030 Superfortresses was moved; it was flown 9,000 miles across the Pacific Ocean, with all the crews and equipment, and was in operation over Korea within nine days of having had orders to leave its bases in America. In contrast, there were not enough suitable types of British aircraft with which to undertake the transit of 30,000 men of the British Army to and from the Far East.

Dealing with the shortage of labour in the aircraft industry, Mr. Profumo said the real cause had a great deal to do with the fact that men were unwilling to transfer to an industry which was almost entirely engaged on rearmament—a development that made employment in the aircraft industry inherently unstable. This danger would be very largely removed if substantial orders were given to the industry for civilian types as well as for military aircraft.

MR. GEOFFREY DE FREITAS (Lab., Lincoln), suggested that the importance of a front-line air force should not be exaggerated to the detriment of research and development. A small front-line bomber force would not necessarily be a weakness if large reserves of brain- and man-power were devoted to research and development of instruments and devices capable of delivering the bomb—and particularly the atomic bomb—with greater accuracy. He estimated that a halving of the bombing error meant that the number of aircraft necessary could be divided by four.

MR. WARD REPLIES

Replying to the debate, the Under-Secretary of State began by assuring Members that the state of Transport Command was not as gloomy as had been suggested. He quoted from official despatches from General Erskine (G.O.C. Middle East) in which great tribute was paid to the work of the Command in evacuating personnel from the Canal Zone. Mr. Ward recalled that last year it had been agreed to replace the Hastings with a jet aircraft, and an Air Staff specification had been drawn up, but it would have been unwise to order a new tactical transport aircraft to replace the Valetta until it was quite certain that American C-119 aircraft were not forthcoming. If that had proved the case, we should have got them without cost to ourselves. Now it was known definitely that we were not getting the C-119s, the problem of maintaining the transport force when the Valetta squadrons started to decline was being urgently re-examined.

Dealing with complaints that the Swift and Hunter would not be introduced into service until 1952, 1953, or 1954, Mr. Ward said he did not want to prophesy, but he would certainly be disappointed if this suggestion was not proved wrong by events. He said his Department was examining the possibility of radically cheapening and simplifying the designs of fighter aircraft to be used in limited and specialized roles. He commended the suggestion by Cdr. Bennett for the land use of arrester gear and assisted take-off, and said that such ideas were being very carefully studied now, not only because of the dislike of taking valuable agricultural land, but also because the performance of aircraft without undercarriages were "very attractive."

Dealing with references to the need for flying experience for medical officers, Mr. Ward said that such officers were, in fact, being given facilities for flying training, and several had qualified as pilots both on jet- and piston-engined types. He replied to comments on the manpower position by underlining the scheme whereby it was proposed to offer commissioned rank to suitable ground warrant officers. He voiced disquiet, however, at the slow rate of recruitment to the W.R.A.F. The figures had dropped from 1,097 in the first quarter of 1951 to 797 in the fourth quarter.

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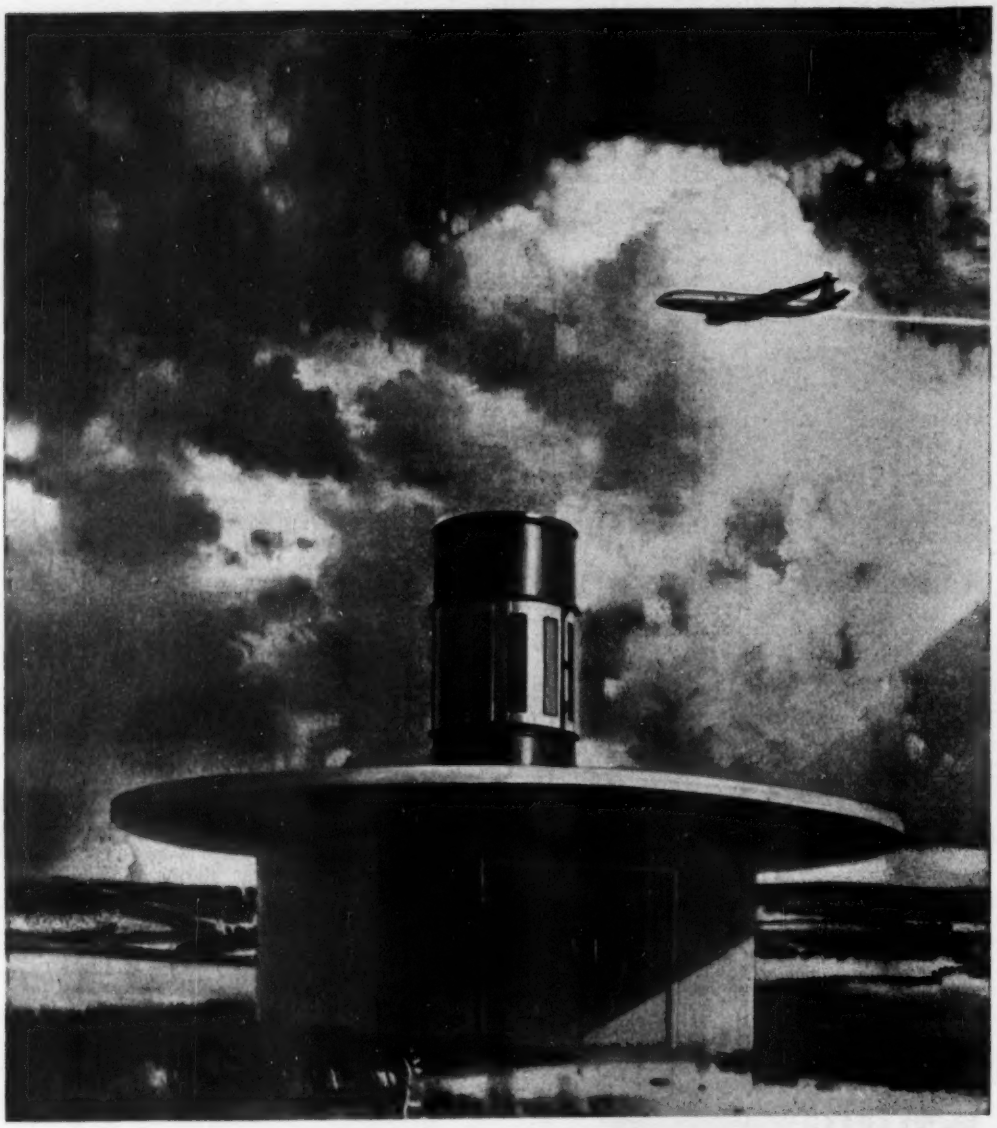

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TERMINAL AIR-TRAFFIC CONTROL

Problems of the Near Future Reviewed by G/C. E. A. Whiteley in a Lecture to the R.Ae.S.

ON Thursday, March 20th, a main lecture of the Royal Aeronautical Society entitled *The Spacing of Aircraft Under High-Density Approach Conditions* was read by G/C. E. A. Whiteley, D.F.C., B.A., A.F.R.Ae.S. An unusually exhaustive treatise, it is here presented in a summarized form.

In his introduction, G/C. Whiteley said that he would confine his paper to a study of the traffic conditions which would be likely to occur at air terminals in the period 1955 to 1965. While he made reference to altitude spacing—its ulitization being assumed—he focused attention primarily on longitudinal and lateral spacing. He assumed a flow of aircraft of many types, arriving from a variety of directions and from altitudes up to 35,000ft. He did not consider departing aircraft, because in their case the consequences of delay were less serious.

Neither tangential nor convergent runways were considered in the paper; with parallel movements only, said the author, it was not, perhaps, too difficult to integrate departing aircraft with those which overshot. Two features of existing air traffic systems, he pointed out, should be eliminated as soon as possible: the stacking of aircraft in the vicinity of terminals and the practice of having large numbers of aircraft controlled by a continuous flow of verbal directions from the ground.

Before coming to the major part of his paper, G/C. Whiteley provided a comprehensive glossary of his terms, which included *Track Mesh Point*—the point downwind of a single runway where the tracks of individual aircraft come to a focus at the beginning of the approach; and *Single Aircraft Fuel Optimum*—the approach procedure which would require minimum consumption of fuel and which could ideally be adopted if no other aircraft were present.

The paper began with a statement of assumptions which the author felt would have to be made. To summarize, these were as follows: a peak traffic acceptance rate of 120 aircraft per hour, and possibly double this rate; all types of aircraft involved, with the exception of rotary-wing types; aircraft coming from all directions with a random distribution of arrival-time; radar or other means capable of redirecting up to 10 per cent of aircraft which err from their allotted track 10 per cent or more of the approaches would be manually piloted; aircraft power regulation generally similar to that current in 1951; air speeds liable to vary by ± 2½ knots, due to a variety of errors; time errors of ± 30 seconds must be catered for; I.F.R. conditions liable to be met up to 35,000ft.

Expanding these assumptions, the author pointed out that while some regulation of departure times would undoubtedly alleviate congestion, it would be assumed that aircraft would often tend to arrive in the zone of the destination with something like a random distribution.

Another factor of paramount importance in the discussion was the existence of precise automatic flying-control equipment and the policy of its use. While autopilots were today nearly foolproof, the traffic approach system would have to legislate for a certain number of *approaches* made manually either because of failure or in order to maintain pilot proficiency against possible emergencies. Universal acceptance of automatic *landings* would appear even less likely than 100 per cent use of automatic approaches. It appeared that there would be reluctance on the part of some pilots to rely on an autopilot for the actual touch-down.

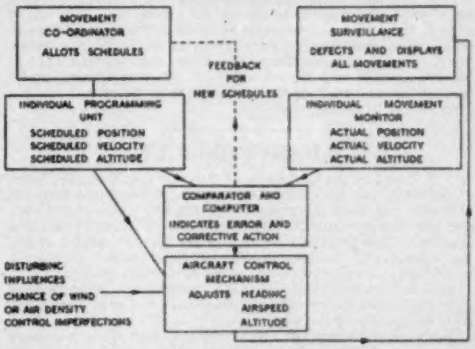

Fig. 1 Generalized air-traffic control system.

THE author of this paper is a serving officer with a record of unusual distinction in specialized technical fields as well as in practical flying. Originally in the Royal Australian Air Force, he was commissioned in the R.A.F. in 1936 and from then until 1939 served in flying-boat squadrons in the United Kingdom, Mediterranean and Far East. During the war he performed specialist engineering and navigation duties in addition to operational flying, and held a number of commands; from 1947 to 1949 he was in the Air Ministry Directorates of Operational Requirements and Navigation; from 1949 to 1951, as an "exchange officer," he carried out navigational and traffic-control research at Wright Field, U.S.A.; and he is at present on a course at the Joint Services Staff College. He qualified on jets in 1947 and holds British commercial pilots' and navigators' licences.

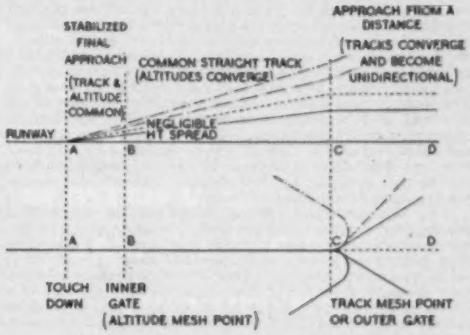

Fig. 2 Phases of the approach—single runway.

G/C. Whiteley then examined the essential elements which would have to be present in any traffic-control system (Fig. 1). The function of the movement co-ordinator was to allot each aircraft a unique moving block of air space—a dynamic niche in the atmosphere. Once an aircraft had been assigned to a particular block, the requirement was to get the aircraft to the centre of the block and keep it there. Provision of information necessary for this was the function of the individual movement monitor or navigation system. The generalized block diagram of Fig. 1 obscured two vital elements of the system: communication and aircraft-identification equipment. Some improvements in both these systems seemed probable. The two methods of regulating approach times which the author considered most satisfactory were either to vary the approach routes in the later stages of the approach, so as to adjust the time of entry at a "gate"—this was a form of holding, but it made the queue less obvious—or to schedule the approach from a considerable distance and, if necessary, to adjust take-off times.

The phases of the approach shown in Fig. 2 were then considered separately by the lecturer. During the last portion of his approach, the pilot would not wish to make any further adjustments for spacing purposes, and so correct spacing must be achieved before the aircraft passed point B. R.A.F. Transport Command had quoted three to four miles as a reasonable distance from touch-down after which attention could no longer be given to fast slow indications. For the purpose of this study, the distance AB could be taken as about three miles. It was now necessary to determine the length of the common straight track BC. If there were no mal-spacing of aircraft at the track mesh point C, it would be assumed that the pilot might have an instantaneous indication of his error, so that he immediately took action to increase his speed by one-fifth. Assuming a total time allowance of one minute for acceleration and deceleration, the distance covered in the overall recovery operation became 10 miles at 150 kt and 16 miles at 240 kt. These distances compared not unreasonably with the straight runs now used with G.C.A. and I.L.S. with somewhat slower aircraft which had better "slow-up" qualities.

The All-Weather Flying Division, U.S.A.F., had also studied

TERMINAL AIR-TRAFFIC CONTROL . . .

the length of this common straight track with a view to the acceptance of aircraft with approach speeds varying between 105 and 160 kt. They had found that the fast aircraft could not enter the final approach gate until 2.6 min had elapsed from the time of entry of the preceding slow aircraft, thus imposing an acceptance rate of 1.8 min per aircraft compared with the one per minute possible with a homogeneous flow.

A further point arising from this was that the longer the common straight track, the slower the acceptance rate with mixed aircraft. There was thus a conflict of requirements due to the advantage of a short distance in facilitating acceptance of aircraft approaching at different speeds and the desirability of a long straight track to permit some schedule-recovery. The solution appeared to lie in grouping similar aircraft, which might be rendered practicable by multiple runways, or reducing the tolerance of arrival-time to better than 30 sec, or by adopting some altitude spacing at the outer gate. Of these solutions the most difficult of immediate accomplishment appeared to be the second. It would be assumed that for some years this would make it desirable to adopt a normal common straight track of 12 to 15 miles. Considering schedule recovery during approach from a distance, the lecturer assumed that the system would have to cater for aircraft with a ground speed of up to 420 kt, necessitating travel of up to 100 nautical miles in the recovery of two minutes' schedule. It followed that it had to be possible to detect how late the aircraft was sufficiently early to pass the information at a distance of 100 n.m. from the outer gate. The distance from touch-down point was then the sum of the stabilized final approach distance (three miles), the straight common track (twelve miles) and the distance approach (say, 100 miles)—giving a total precise-navigation zone of about 115 n.m. Build-up in the delay to be corrected rapidly increased the distance involved; for four minutes' recovery, the corresponding distance was about 200 miles.

G C. Whiteley's next section considered the longitudinal spacing on the common straight track. In connection with this common track, three points had to be kept in mind. First, it had been inferred that its total length would be about 15 to 18 miles; secondly, it was assumed that 95 per cent of the aircraft could take their departure from the track mesh point within ± 30 sec of a stipulated time; thirdly, it was advantageous if this longitudinal spacing could be associated at the track mesh point with some vertical separation.

If an acceptance-rate of one aircraft per minute was to be achieved on a single runway without both elaborate surveillance and large ground staffs, it seemed essential to do one of two things.

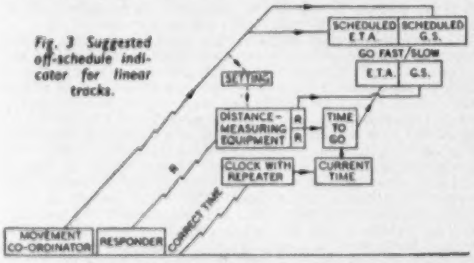

Fig. 3 Suggested off-schedule indicator for linear tracks.

Firstly, each aircraft could house a pictorial-situation display, enabling the pilot to co-ordinate his movements with those of other aircraft. The author believed the C.A.A. had a project of this type—using modified Teleran equipment—the results of which would be of interest. Universal fitment of any such complex devices appeared unlikely in the period discussed. Secondly, a movement programme (either absolute or relative) could be established in advance for each aircraft, and means provided for the aircraft to comply with it. Only the occasional aircraft should err from the space intended for it, corrective instructions being the exception rather than the rule. Attention would be concentrated on the second of these possible flight techniques, and the immediate problem was to establish for each aircraft leaving the track mesh point a suitable programme of movement. The lecturer then examined accepted techniques of aircraft management from these points of view, in the following sections: specified I.A.S. on the common straight track; specified Mach number on the common straight track; specified ground speed on the common straight track; specified linear distance, or flight time, from the aircraft ahead, using airborne search radar; constant linear distance, or flight time, from the aircraft ahead, using ground surveillance or precision approach radar.

In his inference from this section, G C. Whiteley pointed out that flight at a specified indicated or true air speed, or Mach number, had serious limitations due to the possible accumulation of small errors, particularly if combined with altitude separation. In the general case of heterogeneous aircraft approaching at different speeds, it would seem possible to obtain the required spacing only if the pilot had continuous "go fast, go slow" directions based on up-to-date positional and radio information. It thus seemed necessary to provide either an E.T.A. and ground-speed meter, or blind-formation-keeping equipment. Attainment of the one-per-minute I.F.R. acceptance rate therefore required new devices, as yet insufficiently developed.

The lecturer likened an aircraft in the approach to a car with poor brakes, a slipping clutch, and a limited range of speed. Even when all the requisite equipment was available, it remained to be seen whether all varieties of aircraft could follow their dynamic niche sufficiently accurately under all conditions.

Finally, in this section, he observed that reduction of the landing interval to anything substantially below one per minute did not, as a routine operation with mixed traffic, appear to be in sight. Problems of runway clearance could become acute, and the possibility of taking successful overshoot action in the event of sudden runway blockage (due to a crash or burst tyre) might well be reduced to an unacceptable risk.

G C. Whiteley next conducted a similar investigation into longitudinal spacing at the track mesh point, his general inference being that in the case of omni-directional approaches by diverse types it would be extremely difficult to ensure arrival at, and correct departure from, the track mesh point with a 95 per cent precision of ± 30 seconds. New guidance equipment seemed essential, while means for more precise regulating of aircraft speed might be necessary.

Lateral Spacing

The next main section of the lecture dealt with lateral spacing, which had many attractions. The movement of each aircraft into its lane helped the surveillance unit with the identification problem. Communications problems were eased by transmitting only a lane number instead of a movement timetable. Tracking indicators were already standard items with a number of navigation systems; moreover, these instruments gave the pilot up-to-date information based on the accumulated displacement, so that neither pilot nor movements co-ordinator was worried by error accumulation—which could cause concern in longitudinal spacing. The advantages of lateral spacing, however, were largely negatived if the lanes eventually merged on to a single runway, for the capacity of the entire system was then reduced to the acceptance-rate of the single runway and the associated common approach-track—however brief this last phase might be. The use of lateral separation right on to the airfield postulated the provision of parallel runways. The basic consideration underlying such equipment was how close such lanes and runways could be placed. The lecturer instanced a report of the London Airport Layout Panel, which agreed a figure of "at least 6,000ft" for separation of runways for simultaneous I.F.R. landings.

The lecturer concluded that provided a radio datum line was substantially straight, aircraft could track along it very accurately. Practical results had suggested that in the fifteen-mile zone preceding touch-down, parallel corridors could be established with centres perhaps 1,000 yd apart. It appeared to be well within the state of the electronic art to provide such guidance which would lead aircraft on to parallel runways. Consequential surveillance movement problems suggested a re-design of airfields on a two-axis basis, which in turn postulated new aircraft-design requirements with respect to cross-wind landing characteristics.

G C. Whiteley's final section discussed the navigation system which would be required to smooth the arrival rate. The use of D.M.E. beacons in conjunction with off-schedule indicators or other devices was often suggested as an aid to punctuality, shown in Fig. 3. The lecturer discussed the best location for a D.M.E. beacon, together with the possibility of adapting existing equipment to provide tracking facilities of high accuracy over the last fifteen miles of the approach.

D.H. EARNINGS UP

THE Board of the de Havilland Aircraft Co., Ltd., last week reported that net profit of the group, as compared with the previous year, had increased to £1,773,594 from £1,071,101; this was after provision for all charges except U.K. and Dominion taxation. They proposed to pay a 7½ per cent dividend (less tax) on £2,740,912 of Ordinary stock and at 1¾ per cent on £1,664,547 of Ordinary stock for the year ended September 30th last.

Included among the details of the accounts is a credit figure of £100,000, representing "Receipt in respect of Crown use of aircraft designs during the war."

Notes on the annual general meeting of one of the associated companies—de Havilland Propellers, Ltd.—appear on page 360 of this issue.

- V.S. 508
- VENOM
- METEOR
- VALIANT
- AVRO 707
- WYVERN
- ATTACKER
- FIAT G.80
- HAWKER 1067
- GLOSTER G.A.5
- ARSENAL V.G.90
- BOULTON PAUL P.111
- MYSTERE M.D. 432
- AVRO C.F. 100
- FAIREY F.D.I.
- FOKKER S.14
- SEA HAWK
- CANBERRA
- OURAGAN
- D.H. 110
- PULQUI
- SWIFT
- S.A. 4.

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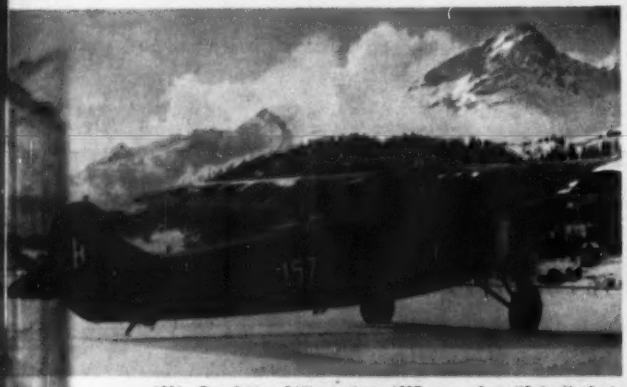
The Wyvern and the Anvil

INTERPOSED between the grandeur of a cumulo-nimbus cloud formation and *Flight's* camera is a Westland Wyvern T.F.4 strike fighter, with Armstrong Siddeley Python turboprop. This mark of Wyvern is being series-produced for the Royal Navy at Yeovil and flight-testing is under way at Merryfield, whence S/L. D. Colvin had brought the specimen which forms the subject of John Yoxall's pictures. The photographic vehicle was Westland's communications Rapide; the "chauffeur" (who himself would have felt equally at home in the Wyvern's Martin-Baker seat) was Mr. R. S. Bradley, who demonstrated a Wyvern with great verve at Farnborough last year.

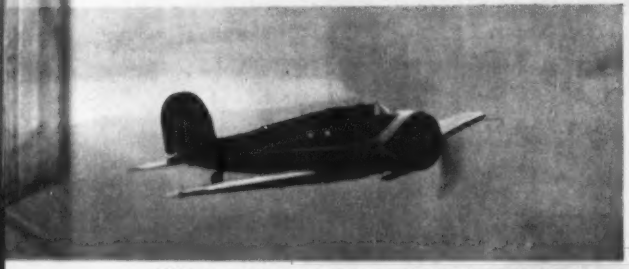
21 YEARS O

Steady Growth and Develop

1931: *Swissair took over two of these Junkers F.13 four-passenger seaplanes from Ad Astra Aero A.G. The F.13 first flew in 1919; the type was in world-wide service for many years.*



1931: *This Fokker F.VIIa, built in 1927, came from "Balair" (Basle Air Traffic Co.). It was later re-registered HB-LBO and in 1950 was retired and presented to the Swiss Postal Museum in Berne.*



1932: *One of Swissair's two red-and-white Lockheed Orion monoplanes. These were the first modern low-wing, retractable-undercarriage transports introduced by a European airline.*

1935: *Swissair was one of the first European airlines to operate Douglas DC-2s. Two are still in service with the company.*

ALMOST exactly 21 years ago, on March 26th, 1931, Schweizeriche Luftverkehr A.G.—Swissair—was formed by the amalgamation of Ad Astra Aero A.G., known as Ad Astra, and the Basle Air Traffic company, known as "Balair."

Ad Astra came into being in 1919 as the first Swiss air transport company. Walter Mittelholzer, for long Switzerland's most famous pilot, was largely responsible for the development of this company and he later became a director and the chief pilot of Swissair, holding both posts until he was killed in a mountaineering accident in May, 1937 During Ad Astra's 12 years of existence it operated with a varied fleet which included Macchi 18 flying-boats, de Havilland D.H.9, Dornier Komet and Merkur, Fokker F.VIIIb/3m and Junkers F.13, A.20 and G.23 aircraft.

Balair was formed in 1925 and soon afterwards opened the first Swiss "long-distance" route, between Basle and Brussels, Rotterdam and Amsterdam. The company operated with Fokker monoplanes of the F.II, F.III, F.VIIa and F.VIIb/m types.

By 1928 Ad Astra was operating a Zürich-Berlin route and Balair had opened a Geneva-Vienna service. The two companies realized that their separate existence, with the division of effort, was not healthy for Swiss air transport; so Swissair was formed, with a capital of S.Fr.800,000. The original fleet consisted of Junkers F.13, Dornier Merkur, Fokker F.VIIa and F.VIIb/3m and B.F.W. M 18D and M23 aircraft taken over from the constituent companies.

Soon after the formation of the new concern two different routes were opened between Switzerland and Paris and in the following year Swissair became the first European airline to introduce U.S.-designed and built high-speed aircraft of the then new low-wing, all-metal, retractable-undercarriage monoplane formula; this was when it introduced two 175 m.p.h. Lockheed Orions on its Zürich-Münich-Vienna service. The venture, which almost halved the flying time on that route, focused much attention on Swissair, brought heavy bookings and proved to the company that its introduction of the new, fast aircraft was a wise policy. In 1935, therefore, the airline introduced a fleet of the then-new 14-passenger Douglas DC-2s and these were used to inaugurate operations to the United Kingdom, when a Zürich-Basle-London service was opened.

In 1936 and 1937, Swissair bought two Junkers Ju86 monoplanes, each powered by two 600 h.p. Jumo 205C diesel engines, thus becoming the second airline to use diesel power (Deutsche Lufthansa having been the first) and the Ju86s were used on the Zürich-Frankfurt-am-Main night mail service, the company having opened a night mail service between Basle and Frankfurt as early as May 1st, 1934.

Swiss air traffic rose steadily and larger aircraft became a necessity; so, in 1937, the company commissioned a fleet of 21-passenger Douglas DC-3s and by 1939 was operating the following routes: Basle-Zürich-Vienna; Zürich-Stuttgart-Halle/Leipzig-Berlin (in pool with Deutsche Lufthansa); Zürich-St. Gallen-Münich; Zürich-St. Gallen; Zürich-Basle-Paris; Zürich-Basle-London; Basle-Frankfurt-am-Main (mail only); Zürich-Basle-Rotterdam-Amsterdam (in pool with K.L.M.) and Geneva-Paris (in pool with Air France). In addition to its regular services, the company has always taken advantage of its magnificent local scenery and undertaken extensive joy-riding and regular sight-seeing tours, a small fleet being maintained for this purpose.

The war had a very serious effect on Swissair's operations, and comparatively little flying could be undertaken. A Zürich-Stuttgart-Berlin service was operated, but on January 29th, 1943, the Stuttgart-Berlin sector had to be abandoned although a few special flights were made to Berlin. Germany was then an extremely unhealthy place for civil airline operation and, in fact, the company's DC-2 HB-ISI was destroyed in a U.S.A.F. raid on Stuttgart. The company

F SWISSAIR

nent of Switzerland's Airline

undertook as much outside contract work as possible in order to keep its workshops active and there was a certain amount of flying training, some Swiss Air Force pilots being trained in civil methods in readiness for post-war work with Swissair.

Air transport in Switzerland had progressed rapidly in the 20 years up to the outbreak of World War II. From the original single-engined flying-boats operating from the lakes, and from converted (or sometimes unconverted) 1914-18 military aircraft flying mail and one or two passengers, a modern airline had been built and Swissair had already achieved a good reputation for efficient service. With the ending of the war, the company set about the task of rebuilding its routes and continuing its development. The DC-3 fleet was increased (at present there are 15 DC-3s and C-47s) and four DC-4s were ordered. By the summer of 1946 Swissair was already flying from Switzerland to Amsterdam, Barcelona, Brussels, Lisbon, London, Madrid, Malmö, Paris, Prague and Warsaw (courier service).

Before the war Swiss airports were small grass fields and much of the airline flying was of the contact variety, made possible by the pilots' intimate knowledge of the country; but after the war great airport improvements took place, and now Cointrin (at Geneva) and Kloten (at Zürich) rank among the finest in Europe. These developments made it possible for Swissair to use large aircraft, while the navigational and approach aids installed have made the company an all-weather airline.

In November, 1946, Swissair's first DC-4, HB-ILA, was delivered, making the first non-stop U.S.A.-Switzerland flight. The second DC-4 was delivered in February, 1947, and the company was then able to plan its first true long-distance operations.

A further consolidation of Swiss air transport took place early in 1947, when the small Alpar company joined Swissair. In the spring of that year a regular service was established between Switzerland and Jerusalem and Cairo, thus extending the company's operations into three continents. A fourth continent was added when, on May 2nd, 1947, Swissair made its first flight to the U.S.A.—a DC-4 flew from Geneva to Washington. A regular transatlantic service was not immediately established but a number of further flights were made.

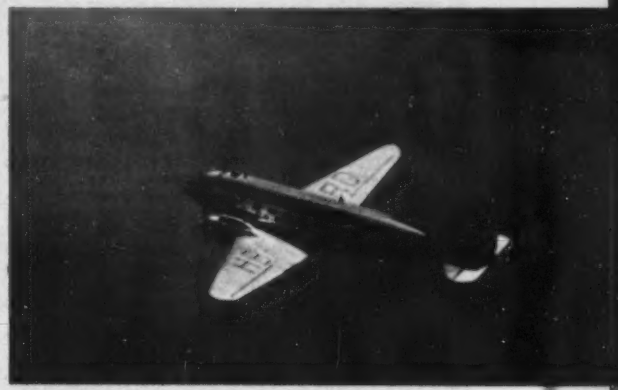
A series of flights to Johannesburg was begun on August 3rd, 1947, and on October 10th Swissair sent a DC-4 on a special flight to Buenos Aires. Special flights were also made to Bombay. It was also in 1947, in July, that the company ordered four Convair-Liners for use on European routes.

With its fleet of DC-3s, DC-4s and Convair-Liners Swissair had now taken its place among the great European airlines, so that it was not surprising when, in August, 1951, the company took delivery of the first two 50-passenger Douglas DC-6Bs to arrive in Europe. These aircraft have been introduced on the company's transatlantic services and they have already made some fast crossings of the ocean. On the night of January 30th-31st the *Zürich* flew non-stop from New York to Geneva in 10 hr 24 min, making the actual ocean crossing from Gander to Shannon in 4 hr 36 min. Both these times created unofficial records for commercial aircraft. A third DC-6B is due for delivery to Swissair next month and three more are on order for 1953.

For many years the unpainted, highly-polished aircraft of Swissair have been a familiar sight in European skies, for the Swiss colours, consisting of a white cross on a red field painted right across the fin and rudder, can be seen from a distance of several miles. With the introduction of the DC-6Bs the company adopted a new colour scheme, having a white-topped fuselage with red "cheat" lines. This scheme has now been introduced on the DC-4s and Convair-Liners, as illustrated on this page.

Last year Swissair, for the first time, flew 10,000,000 kilometres in one year, also for the first time it carried over a quarter of a million passengers in one year. J.S.

1936: *Two Junkers Ju86s, each powered by two 600 h.p. Junkers Jumo 205C diesels, were used on certain pre-war routes.*



1937: *The famous DC-3, first introduced by Swissair in 1937, still forms the main equipment of the company.*

1946: *On December 8th, 1946, the first Swissair DC-4 was named "Genève" at a ceremony at Cointrin Airport. Two are now in service.*

1949: *Four Convair-Liner CV 240-11 aircraft were added to the Swissair fleet. The photograph below is the first to show the Convair-Liner in the company's new colour scheme. The latest addition to the Swissair fleet, the DC-6B, was illustrated in "Flight" last week.*

THE THROTTLE-BENDERS

No. 4 *R. R. Paine*

By H. J. COOPER

THIS is the fourth of a series of articles describing the air-racing careers of the present six members of the "Throttle-Benders' Union"—the unofficial brotherhood of regular participants in British air races. The other five pilots are S/L. J. Rush (the subject of the first biography in this series, published in "Flight" of July 6th last), J. N. Somers (October 5th), A. L. Cole (November 30th), C. G. Allington and F. Dunkerley.

"Flight" photograph

THE subject of this article, who, since he started in 1946, has done as much air-racing as anyone, gained his pilot's licence in 1937, and now has about 1,500 flying hours in his log-book.

From an early age Ron Paine has been interested in aircraft and racing cars—not surprisingly, perhaps, for as a youth he lived at Byfleet, right beside the famous Brooklands race-track and aerodrome. All his free time was spent there, watching the activities of the old Henderson School of Flying. Inevitably he became determined to be involved more intimately in aviation, and on leaving school in 1930 he got a job as an engineering apprentice with Vickers, Ltd., where his older brother—A. S. K. Paine, commonly known as "Buster"—was already employed. Here Ron had experience of the production of the Siskin fighter and the Hawker Hart, and of various other contract work given to Vickers.

After a year of this he left to take a job offered by Duncan Davis and Bill Massey at the Brooklands School of Flying. There, engaged mostly on engine installations and general airframe maintenance, he also studied for his Aircraft Engineer's Licences, which he gained when he was 21, the earliest age at which they can be held.

He came in contact, too, with such people as Thompson and Taylor of racing-car fame, who built the *Bluebird* for Sir Malcolm Campbell. Here he was able to get first-hand experience of tuning engines, which undoubtedly has proved of the utmost value to him in his air-racing career, for, while he keeps the airframe of his present aircraft in perfect condition, he is also an acknowledged expert in getting the maximum output from any given engine.

Naturally he was keen to become a pilot, and when each aircraft was brought out from its overhaul it had to be taxied from the shops to the school hangars before its test-flight. So Ron's first "flying" instruction began by accompanying pilots on these ground journeys and getting to know the control movements. Most of these aircraft were fitted with dual controls, but if for any reason there was no control-column in the socket in the back cockpit, Ron saw to it that one was there whenever he was free to make a taxi trip. Then, when the aircraft was test-flown, he was able to get in about ten minutes' dual under such competent instructors as Duncan Davis himself, Bill Thorne, George Lowdell, Max Findlay, Ken Waller and Leslie Cliff.

In 1933 Brooklands had the job of test-flying a Hawker Tomtit fitted with a 185 h.p. Wolseley A.R.9 nine-cylinder radial in place of the usual Mongoose. Numerous flying tests had to be made, each of about an hour's duration, and although it meant getting to the aerodrome by 7 a.m. Ron went up on these flights and so obtained some further valuable instruction. Soon he could fly quite competently, but had not actually got his licence.

In 1937, at the age of 23, he was appointed chief engineer to the South Coast Flying Club at Shoreham, which was an associate company of Brooklands Aviation. There he was able to take his "A" licence. He was checked out by C. L. Pashley ("Pash"—who last year completed 40 years of flying instruction), who sent him up in a Gipsy I Moth, G-ABTS. A crowd of pupils and pilots had, as is usual on such occasions, collected to watch his first solo. After a circuit Ron brought the Moth round very low over the bridge which crosses the River Adur—so low, in fact, that he was not seen by the watching crowd. He pulled up after a very short landing run and, still unnoticed, taxied back to the hangar, got out and joined the crowd waiting for him to land!

He became closely concerned with air-racing in 1938. Both he and Leslie Cliff had recently flown a Hawk Major, G-ACYX, which they found, for some inexplicable reason, to be considerably faster than the standard type. It belonged to a private owner who kept it at Godalming. Obviously this was a good entry for the forthcoming King's Cup—a perfectly standard aircraft which had a performance above the normal. It could be entered as standard, and there would be no mods. to declare. The owner agreed to hire it to them; they got it to Brooklands and gave it the usual polishing before taking it to Hatfield for the race. That year the course consisted of 20 triangular laps, each of 50.607 miles, making a total of 1,012 miles. After leading for 18 laps, the Hawk Major, flown by Cliff, was passed by Alex Henshaw's winning Mew Gull and by Giles Guthrie (also in a Mew Gull), but gained third place at 146.25 m.p.h. It had been handicapped to do 142 m.p.h. Third prize in those days—£375—was a lot better than first prize today, and competitors then got free petrol and oil, plugs, tyres and so on, all of which have to be paid for now.

For the next King's Cup, Ron got to work thoroughly on CYX and, by completely stripping it down, overhauling the Gipsy Major and making a number of small drag-decreasing mods., succeeded in getting its speed up to the phenomenal figure of 158 m.p.h.—an increase of 12 m.p.h.!

But the war came and there was no King's Cup in 1939.

Ron Paine remained as chief engineer at Shoreham until the war started, when all personnel from Brooklands and Shoreham moved to Sywell (also controlled by Brooklands Aviation) before being dispersed for various duties. Ron was appointed civilian engineer to an Air Navigation School which Brooklands Aviation

Ron Paine (on wing) with his special Miles Hawk Major three-seater, G-ADCV, in which he flew his first race—at Lympne (where this photograph was taken) in 1946, the enclosed rear cockpit seated two passengers in tandem.

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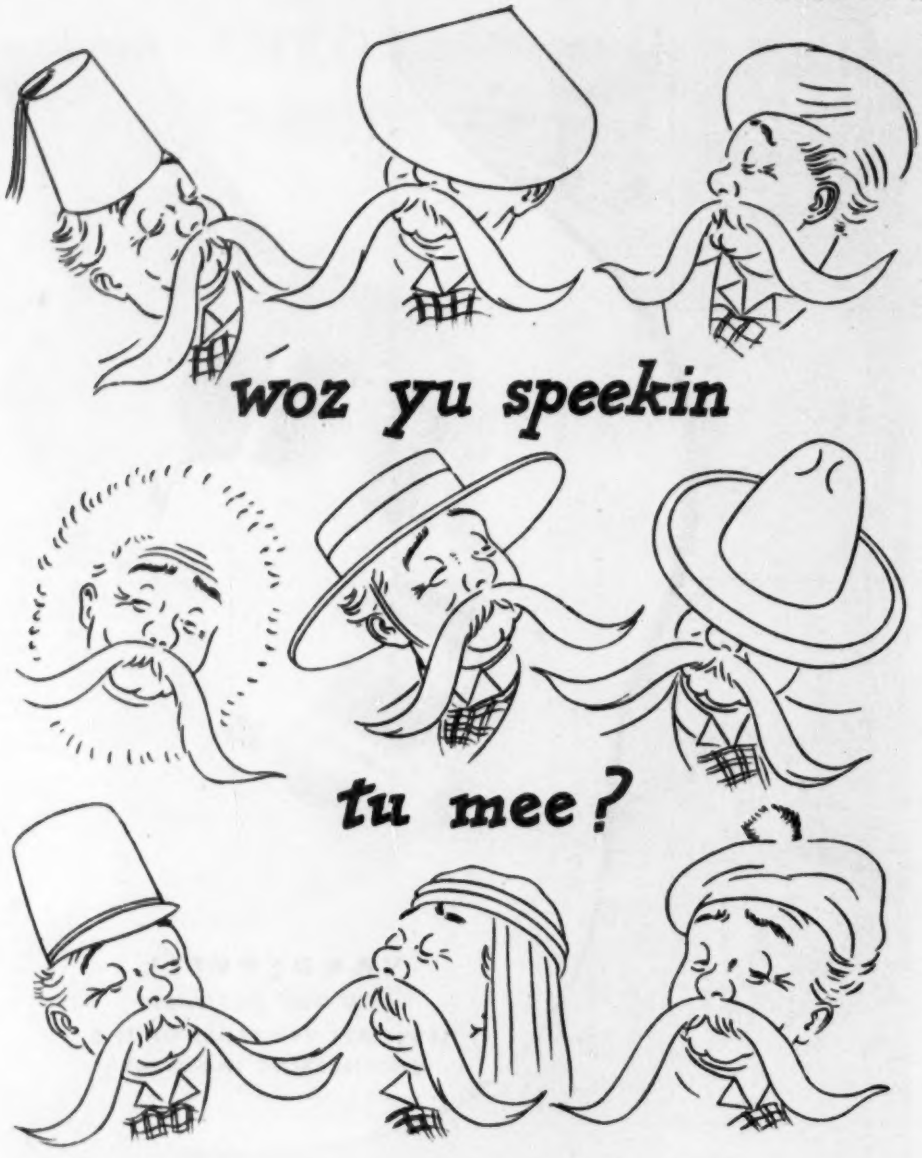

Yu kan argyu yore hed off abowt simplifide spelin and wether forenerz shood awl tork inglish tu make things eezi for egsport, but thairz wun thing sertin: yoozers ov Desooter Toolz speek the saim langwij in awl partz of the wurld, and it iz kwite kleer to everywun. Even tu americanz, hoo bi lotz of Desooter Toolz. Thiss iz wot they say:

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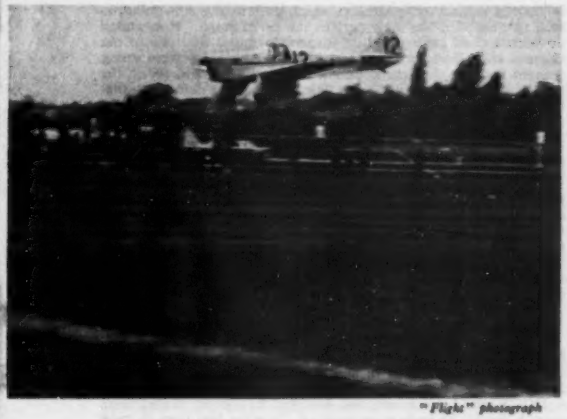


"*Flight*" *photograph*

The Hawk Speed Six, G-ADGP, approaches the finishing-line in the 1949 *King's Cup Race at Elmdon, Birmingham. Paine was second in his heat, and beat Tony Cole for second place in the final at* 184 *m.p.h.*

THE THROTTLE-BENDERS...

started at Squire's Gate, Blackpool. After remaining there until 1940, he joined Air Schools, Ltd., at Derby, a company directed by Roy Harben, which controlled Elementary Flying Training Schools at Derby (No. 16—with Harben himself as C.O.) and at Wolverhampton (No. 28, under W/C. West). Each of these schools had 108 aircraft, Magisters at the former and Tiger Moths at the other, and each had 150 ground engineers on strength. The crash-rate at so large a training organization at such a period was inevitably high, and Ron had his time fully occupied. Nevertheless, he flew whenever possible, and continually increased his flying hours, flying even on his day off.

Immediately after the war he bought his first aircraft. Because of his close liaison with the Miles factory at Woodley, manufacturers of the Magister, he had become thoroughly conversant with their designs; and in 1946 he heard that a special three-seat Hawk Major, G-ADCV, was for sale. This Hawk was unique. It was generally similar to the standard Hawk Major, but had an open cockpit in the front for the pilot, and an enclosed double cockpit aft, seating two passengers in tandem. It was then on the books of W. S. Shackleton, Ltd., and housed—dismantled—in a garage at Hatfield. Ron flew from Wolverhampton to Panshanger to see it, and immediately knew that he wanted it. It was transported to Wolverhampton and, when pressure of work permitted, Ron worked on it and got it airworthy for the time when civil flying would be resumed. G-ADCV was given a C. of A. about March, 1946, and so became one of the first privately-owned aircraft to fly after the War.

It was in DCV that Ron flew his first race when, in 1946, the enterprising Cinque Ports Flying Club, with the co-operation of the Royal Aero Club, revived the Lympne races. Entering for the Folkestone Aero Trophy, he found himself too heavily handicapped to get a place, and the race was won by John Grierson, flying one of United Whalers' Walrus amphibians at 121 m.p.h.

By 1947 Ron was flying regularly one of the Wolverhampton club's Hawk Trainer IIIs (the civilian name for the Magister), G-AHNU. The racing season opened with a revival of the Isle of Man races on Whit Monday, and Ron piloted HNU in the Manx Air Derby, a handicap event over a course totalling 158 miles. After battling round the course at 122.5 m.p.h., he found himself well back; it was, he says, the roughest race in which he has ever flown. First place was taken by Tommy Rose in a Hawk Speed Six, G-ADGP.

After the Isle of Man races Ron decided that if the Hawk Trainer was to be a useful racer it would have to be cleaned up, so by the time the Southend Trophy Race was flown on August 9th, 1947, he had considerably modified HNU. Most important of the alterations was the covering-in of the rear cockpit. This was the first Hawk Trainer so improved, and many other pilots have since adopted the idea. Wheel-spats were fitted, and the usual fairing-in took place. The 21-mile course had to be lapped three times, and Ron won his heat at 136.5 m.p.h. He was thus in the final, and in this also he came in first, winning the trophy after a very close fight with Nat Somers, who had pulled up to second place in his Hornet Moth.

From Southend to Lympne. The Folkestone Aero Trophy was held on August 30-31st, and Paine came in second in his heat at 138.5 m.p.h., having slightly increased the speed of HNU by careful tuning of the Gipsy Major and improved fairing; but he could not reach a higher place than sixth in the final. The Siddeley Trophy was contested concurrently with the Folkestone race and, again representing the Wolverhampton club, he gained third place.

By the end of 1947 he was beginning to get really enthusiastic, and started looking around for a faster mount. Certain aeroplanes at Miles Aircraft came up for sale, and among them was the Hawk Speed Six, G-ADGP; it had belonged to Luis Fontes, a well-known pre-War racing pilot (who was killed while flying with A.T.A.). George Miles had fitted it with a large bubble canopy and Tommy Rose had, as mentioned, raced it at various meetings. Ron went to see "Bush" Bandidt, sales manager to Miles, and told him he wanted to buy DGP. He was told to "get on the end of the queue," as quite a number of people, including Jimmie Rush, were after it; but Ron badgered Bush so much that finally, on the telephone at 9 o'clock one morning, he was told he could have it. He promptly left Wolverhampton in a Messenger for Woodley, and had the Speed Six back there by lunch-time. It was, he says, one of his proudest moments when, so many years after first wanting DGP, he became its owner, as he had much admired it after seeing it built at Woodley in 1935. It was in splendid condition and there was no other similar type flying.

The first Goodyear Trophy race was flown on June 12th, 1948, at Wolverhampton, and it was in this event that Paine first piloted the Speed Six. He had not flown it much by then, and he did not gain a place, but he discovered enough about its characteristics to see its possibilities.

In the next Lympne races (1948) Ron flew the Hawk Trainer, HNU, again. That year the Royal Aero Club introduced "one-design" racing, and organized non-handicap contests for each of three types—Tiger Moth, Tipsy and Hawk Trainer. Ron flew in the contest for the last-named type, together with three other pilots, R. E. Pyatt in HNV, S L. L. S. Loveridge in HNW and Derek Jemmett in KPE. The interesting thing about this race was that although the four aircraft were basically standard, four different types of airscrew were used, each pilot using that which he considered best for the Hawk Trainer when racing. The result proved that Jemmett's fine-pitch airscrew gave a higher speed, for he finished first at 103.25 m.p.h. The speed of all contestants was naturally lower than would have been attained over a longer course: this race was over three short laps, so that the competitors were in sight to spectators on the aerodrome all the time. Paine himself, with a coarser-pitch airscrew, finished third at 101.75 m.p.h.

In the Thruxton races of 1948 he flew the Speed Six. The course was from Thruxton to Totland Bay, Isle of Wight, and back, and he finished fourth at 178 m.p.h.

When Tommy Rose had raced the Speed Six he had come in second in the Percival Cup race at Portsmouth in May, 1947, at

Paine's Speed Six as it appeared in 1950, *with the undercarriage trousers lengthened to within* 1½*in of the ground. In this condition, and with a number of other modifications not visible in the photograph, it established a closed-circuit class record in the King's Cup Race of that year.*

THE THROTTLE-BENDERS...

171.5 m.p.h.; first in the 1947 Isle of Man race at 181 m.p.h.; and had won the Southend Air Speed Cup for the best time in the 1947 race, at 178 m.p.h. By the time the Siddeley Trophy race was flown in October, 1948, DGP was entered and Ron Paine flew it at 179 m.p.h. In that year the Siddeley Trophy became a race in its own right for the first time; before the War it had been awarded to the club-entered pilot who attained the highest place in the King's Cup Race. The 1948 contest was flown at Wolverhampton, the course being three laps of a 64½-mile circuit. Ron still had had little time in which to fly DGP, and in fact was still getting used to it. He was flying over country he knew well, so his navigation was not at fault; but, in order to avoid a mix-up with the slower entrants at the turning-points he often had to go quite high, and his speed was accordingly lowered by the time lost in the climbs. He flew from scratch and managed to pull up to eighth place out of the 16 pilots who qualified for the final.

After the 1948 races he decided that there was more to the air-racing business than just entering an aircraft and letting the handicappers assess its speed according to their slide-rules: you had to try positively to beat them. So, in a manner of speaking, he continued fairing-in DGP where George Miles had left off. With the help of the Air Registration Board, who willingly gave him assistance (Ron says he has always found them helpful and co-operative) he modified the Speed Six to his own specification.

With the new modifications the speed began really to go up. The large gaps that had existed between the ailerons and flaps on the under-surface of the wing were faired in with strips of fabric, and this proved to have a very definite influence on the speed. The Gipsy Six engine was overhauled; Hobson's kindly overhauled the carburetters, high-compression pistons were fitted and the speed rose step by step. When the first National Air Races were held at Birmingham, Paine entered the Speed Six for the King's Cup. He came in second in his heat at 185.25 m.p.h., and very nearly made first place in the final, but that was gained by Nat Somers, whom he chased into second place after overtaking Tony Cole's Swift right on the edge of the aerodrome. This race was for Paine the most exciting, and he has never fought a closer finish.

The Thruxton races were held on August 21st, 1949, and the Wiltshire Flying Club instituted one-design races. In the event for Hawk Trainers he flew G-AKPF, coming in first at 121.25 m.p.h. This was a standard aircraft, but had in fact been fitted with the fine-pitch airscrew from KPE, in which Derek Jemmett won the Lympne race the previous year. The quick take-off which this gave enabled Ron to get ahead of the other competitors immediately, and he stayed in front all the way. (In races of this sort it is usually the first man round the first turning-point who wins.) Ron had flown KPF in the 1949 Goodyear Trophy, averaging 126.5 m.p.h., but had not gained a place. Giles Reid-Walker, flying a Piper Super-Cruiser, had won at 115 m.p.h.

In the open handicap at the 1949 Thruxton races Ron flew the Speed Six. He made only ninth place, but set up best time of 188.75 m.p.h.—an increase of 2.5 m.p.h. over his previous speed in DGP.

Artful Devices

For the 1950 King's Cup a new Fairey-Reid metal airscrew was fitted to the Speed Six. By extending the length of the under-carriage fairing trousers to within 1½in of the ground, and by fitting smooth instead of treaded tyres, Ron pushed up the speed still more. The air-scoop was removed from the port side of the cowling and, with the help of George Blanchard of the de Havilland Engine Co., the flame-trap was abolished. A rammed-air intake was fitted, projecting forward to within 1½in of the airscrew, and the exhaust stubs were redesigned to give a better shape. The compression ratio was increased from 5:1 to 6:1 and, by the fitting of aluminium-alloy instead of aluminium-bronze cylinder-heads, the weight of the engine was reduced by over 20 lb. The airframe surfaces were polished with an electric buffing-wheel.

During the race Ron made an average of 191 m.p.h. and he finished ninth. But at the same time he set up the 100 km Closed Circuit Record in Class C.1b (500–1,000 kg) at 192.83 m.p.h., which still stands. In recognition of this achievement he was later awarded a Louis Blériot Medal by the F.A.I.

On the morrow he competed for the Goodyear Trophy, flying KPF, and in Heat 1 finished ninth at 121.5 m.p.h.

The Air League race of 1950 was held at Sherburn-in-Elmet aerodrome, Leeds, on July 22nd, and during this event Ron had to make a forced landing. He was doing very well and hoping to catch up Wallace Lashbrook, who was in the lead, when suddenly the cockpit of the Speed Six began to fill with fumes. A complete cockpit check revealed no cause for the trouble, and Ron decided he had better get down quickly, as there is no ventilation in the cockpit at all. Through the low cloud and generally bad visibility he spotted an aerodrome—Church Fenton—a few miles off, conveniently lit up with sodium flares; so he made for it and slipped in smartly behind some Meteors which were taking off—going, in fact, to Sherburn for their part in the programme. Ron pulled up with a dead engine and on inspection found that one of the exhaust stubs had broken away and that the gases were going straight through the engine bulkhead into the cockpit. With the help of R.A.F. personnel he was able to repair the damage so that he could fly back to Sherburn; but by then, of course, the race was over and Lashbrook (Proctor) had won at 161.8 m.p.h.

Earlier in the day Paine had made third place in the race for the Yorkshire Aeroplane Club Trophy at 178.5 m.p.h., the slightly lower speed being caused by the shortness of the course.

In the 1950 Thruxton Race he again flew the Hawk Trainer HNU. The Wolverhampton Aero Club, who were operating this aircraft, gave their engineers a free hand to modify it for the race. It was flown with both cockpits open, but had the control surfaces faired over, and a metal airscrew was fitted. The course was 75 miles long—from Thruxton to Totland Bay, Isle of Wight, and back—and there were 15 entries. Before reaching the first turning-point Ron had overtaken Douglas Jemmett (Hawk Trainer KPE), who had started ahead of him, and he raced back into first place at 136 m.p.h.

In the race organized by the *Daily Express* in 1950 from Bournemouth to Herne Bay, DGP, flown as in the King's Cup, averaged 204.06 m.p.h.—partly with the help of a following wind—and Ron made fastest time in his weight class.

DGP's speed has meant that Ron has frequently started from scratch, which he finds most exciting. It gives him time to work out the speeds of other competitors, and he thus knows that if he has passed a certain aircraft by the time he has reached a certain point on the course, he is so much ahead. Generally he watches Fred Dunkerley, who is as likely as anyone to be a dangerous rival. For the scratch man navigation plays a specially important part: he is in the air for a shorter time, so an error results in a greater loss, and Ron doesn't believe in following the man in front. If he finds that one aircraft has beaten the handicappers by 1 m.p.h. he must beat it by 3 m.p.h. to stand a chance of getting into the finish.

A Scoop for the T.B.U.

His first race last year was the Goodyear Trophy, held on May 26th. In this race the Throttle-Benders recorded an outstanding success, Fred Dunkerley (M.28) winning it, with Tony Cole (Swift) second, and Paine himself finishing third at 136 m.p.h. after a very close fight all the way, He flew a standard Hawk Trainer, G-AKMN.

The Bristol Air Race at Whitchurch on July 14th also had Paine as a competitor. This time he took off most of the mods. he had made to DGP, re-installed a tailwheel instead of a tail-skid, and so on, so that the handicappers, knowing the speed which the aircraft had last made, had to work backwards and increase his allowance! The speed was still high—193 m.p.h., which can only be attributed to the weather—but lower than the Speed Six could have made with all its clean points unimpaired. But he really did beat the handicappers, for he came into first place comfortably.

In the same condition the Speed Six was entered in the second *Daily Express* race, wherein it finished 16th, just out of the prize-winning places, but making 198 m.p.h. In this race Paine had a rival in his brother, who flew a Proctor I. Ron knew it to be a fast Proctor (it did 167 m.p.h.) and he feared it more than he did any other competitor. But as a matter of fact it was the third aircraft he passed on the route, because apparently the handicappers also knew it was fast!

Ron Paine is now technical director on the board of Air Schools, and that firm, besides running the reserve schools at Derby and Wolverhampton, has specialized in modifying and rebuilding certain types of aircraft. The one and only Hendy Heck, G-AEGI, for example, was rebuilt for John Crammond after it had had its tail knocked off by a Spitfire in the 1950 King's Cup Race.

As a result of Nat Somers' winning the 1949 King's Cup in his Gipsy-powered Gemini, other pilots—among them John Houlder, of Elstree—became interested in having similar aircraft instead of the standard Cirrus-powered versions. Air Schools experimented at Wolverhampton by fitting 145 h.p. Gipsy Major 10 engines, and the version so powered—the Gemini IIIA—has now been cleared by the A.R.B. as a production type. It has the all-up weight increased by 300 lb. The adaptation work was effected with the help of "Bush" Bandidt and John Houlder, and several Gemini IIIAs have since been delivered. The Hon. Max Aitken has taken delivery of one (G-AJTG), known as the Gemini IIIB, fitted with retractable flaps.

Most of the National Air Races this year, including the King's Cup, are scheduled to be flown at Newcastle upon Tyne Airport, on July 11th and 12th. No doubt Ron Paine will be among the entrants, and, as usual, he may be expected to enter for other events which form this year's aviation calendar. He does not let many races go by without having a crack at them.

THE CHEAPEST AIRFRAME

Metal or Wood? An "Ultra-light" Argument Further Pursued

AN article written by "W.T.G." which appeared in "Flight" of January 25th, 1952, under the titles "Metal or Wood—a suggested structural concept for a practical ultra-light aircraft" has aroused a considerable amount of comment. In particular, a constructive criticism contributed by "E.B.C. and F.W.V.", which appeared in our issue of February 8th, has raised a number of controversial points. This contribution was answered by "W.T.G." on the correspondence page of "Flight" of February 29th, and in the accompanying article we accord the two challengers a last word on this highly controversial subject.

THE further views of "W. T. G." on the subject of the cheap ultra-light aircraft suggest that he is letting his enthusiasm run away with him. Whilst we share his views on the very pressing need for a suitable machine, which will put private flying on a sound footing, we still cannot bring ourselves to agree to the type of construction he advocates. It seems perfectly obvious that, whatever numbers of this type of aircraft are produced, the minimum overall cost will be achieved by utilizing the least expensive of the possible raw materials.

The system of basing the design on the minimum number of components does not automatically produce the cheapest, simplest and lightest structure. Taking W.T.G.'s argument on this point to the limit would suggest that a monolithic structure is the ideal: but whilst this would produce the optimum from the weight aspect it certainly would not be cheap or simple. While on this subject it is interesting to note that the so-called simplified construction used on the Seabee has not been adopted for any other aircraft. If it is as good as W.T.G. suggests, why has it not been repeated? We would suggest that the answer is that the production cost is exorbitant.

W.T.G. stated that his all-metal structure would be dictated by the demands of the export market. We must, of course, agree that metal will stand up to tropical climates much better than wood. However, if he is convinced that 90 per cent of the total production would be sold abroad, he should get in touch with light aircraft manufacturers and ask their opinions. He will find that it is very difficult to sell any light aircraft abroad, due to the restrictions which foreign countries place on import licences. Of the machines that do reach the overseas market the great majority are destined to be used commercially and not for pleasure flying. These facts, although of a rather sombre nature, point to the aircraft being designed for home consumption; but in any case, if the machine is produced in this country, the market will have to be proved here. Money being scarce, the machine will need to be really cheap to sell at all, and we are convinced that a wooden structure, carefully designed, will show a decided advantage over the use of metal in this respect.

If, as we all hope, there would be a substantial market for this aircraft, not only would the metal aircraft be planned for mass production, but so would our wooden one. There is no reason to suppose this impossible in wood; in actual fact, it would be a far less formidable task to provide the initial jigs and tools associated with a wooden aeroplane than to set up the special-purpose machinery (e.g. presses for forming a one-piece wing skin) that would be required on the simplified metal conception.

Production Costs

W.T.G. says that current car prices are at an artificially high level; but what isn't? Surely the two main reasons for the high price of all commodities in these days are material and labour costs. On a metal aircraft, the raw materials (duralumin and steel) are, due to the present shortage, both difficult to obtain and also costly. The type of labour required, in the main, would need to be of a fairly skilled nature—by "tin-bashers" and the like. With the type of jigging we have in mind for the wooden aircraft, semi-skilled labour could be quite economically employed; and the point that W.T.G. raised in connection with his conception, that of the elimination of close tolerance machining, is equally applicable in our case.

Another aspect, which appears from W.T.G.'s writings to be of small consequence, is the question of weight. This is probably one of the greatest headaches to all aircraft designers and is of major importance whatever size of machine is envisaged. Apart from the fact that a heavier aircraft will obviously cost more, every pound of excess weight means losses of aerodynamic efficiency and requires extra power. Taking your contributor's proposed wing-skin thickness of 10 s.w.g. and assuming a wing area of 100 sq ft, we arrive at the weight of 370 lb for the wing covering alone. Dropping the thickness down to 12 s.w.g. reduces this to 300 lb, but we still have a spar and a few ribs to add in. An average wing-weight/all-up-weight ratio is 0.16, but if we take a figure as high as 0.25, this gives the minimum all-up-weight for the simplified metal aircraft proposed by W.T.G. as 1,200 lb. This is much too heavy and lifts the machine out of the ultra-light class.

If, as he says, the spar is to do most of the work of transmitting the wing lift to the fuselage, why should we use a covering other than that needed to maintain the aerofoil contour? Unless the skin is going to be used to its full capacity as a load-carrying member it will only provide a most uneconomical covering and on such a small aircraft the weight penalty cannot be borne. Even supposing that the wing was designed as an all-metal structure on the principle of making every piece of metal do the optimum amount of work in order to keep the weight down to a minimum, we should find that we were restricted in our choice of wing-skin thickness by the minimum sizes available. Whereas the minimum practical skin thickness is 26 s.w.g., this would be more than ample for strength on many parts of such a small mainplane, and on a weight basis a plywood skin of 0.075in thick could be used in lieu of this gauge in duralumin.

The Final Choice: Wood

The above arguments, which also hold for the fuselage and tail surfaces, are sufficient in themselves to show that a wooden aircraft has much to recommend it on the score of simple and efficient design, weight and manufacturing needs. From the point of view of the private owners or flying clubs who operate this type of aircraft there is no doubt as to which machine will be the least expensive to maintain and repair. Machines in this class will receive the usual amount of rough handling, and they will be damaged however sturdily they may be built.

In our original article, "Metal or Wood," we stated that the single-spring undercarriage leg was quite satisfactory—and that although a weight penalty was involved this would be accepted in the interests of simplicity; our friend, on the other hand, appears to think that no such weight penalty exists. The present authors, however, have recently been engaged on the investigation of single-spring legs and it was found that they are heavier than the more normal types of undercarriage incorporating oleos or bungee springing. On the subject of petrol/oil mixtures, apart from the legalities involved in mixing the two fuels, we are sure that no one—not even owners of two-stroke motor cycles—would use it if they could satisfactorily run on straight petrol.

With regard to the Civil Airworthiness Requirements, we feel that designers of such a machine would welcome any relaxations which may be forthcoming from the Air Registration Board. When one considers that the existing requirements cover all civil aircraft up to and including the Brabazon, it becomes apparent that they cannot fairly represent both ends of the scale on each and every item. Any arguments about the requirements, however, do not affect the main issue, as whatever A.R.B. decide will apply equally to wood or metal.

F.W.V., E.B.C.

NAVAL TEST-FLYING

How Acceptance Trials Are Carried Out: Catapult, Rocket and Arrester Tests

By Lt.-Cdr. E. M. BROWN, O.B.E., D.S.C., A.F.C., M.A., R.N.

THERE are many complex aspects of flight-testing any aircraft, but more especially a naval aircraft, the task of which is so highly specialized and severe. Obviously, the main difference between a naval and a shore-based aircraft is the fact that the former must be capable of operating from an aircraft carrier at sea as well as from a land airfield, although it is statistically true that 80 per cent of its flying life will be from *terra firma* rather than from a carrier's flight-deck. However, this minor seaborne percentage of its life dictates its whole design, and it is to test the efficiency of that design that the test pilot exists as a recognised specialist.

I am convinced that the qualities necessary in a first-class test pilot are endowed by nature and cannot be indoctrinated by a training-school. The essentials are a keen analytical mind, infinite patience, lightning-like reactions, and an ice-cool brain in emergency. Other qualities are required, too, both physical and mental, but they, unlike the essential ones, can be induced or developed.

I might illustrate my point by taking the hypothetical case of an aircraft losing control under test at high speed near the ground. The pilot may take four desperate, but distinctly different, courses of action before he succeeds in recovering from a disastrous situation in a matter of seconds. Later, in the peaceful aftermath of reflection on the incident, he should be able readily to recall the line of action he took to regain control of his aircraft; but the really great test pilot will also recollect the details of the other three unsuccessful attempts which may reveal something far more important to the aerodynamicist in his analysis of the incident. I doubt if training will ever give such supreme standards.

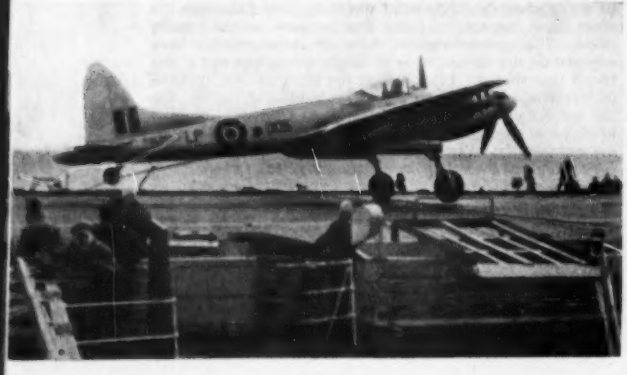
[At this point in Lt.-Cdr. Brown's notes, as issued by the Admiralty, the author goes on to discuss some basic aspects of naval-aircraft design which will be familiar to most *Flight* readers. We, therefore, continue the narrative with his very informative description of testing methods.—ED.]

From the moment a naval aircraft is conceived in the form of a design specification until it reaches its fully fledged status as an approved Service type, its development is entirely under control of the Ministry of Supply, with the manufacturing firm on the one hand and the Admiralty on the other assuming secondary control at various stages in its embryo career.

Briefly, the sequence of events is that the firm which receives the contract to build a prototype undertakes the flight-testing through the initial stages up to a point where they consider it fit to undergo Service acceptance trials, and then they pass it on to the A. and A.E.E. at Boscombe Down. Here its handling characteristics are checked with particular reference to its suitability for deck landing.

If satisfactory, it is passed on to Farnborough, where it is put through its paces in arresting and catapulting up to the absolute-factor limits to which it was designed. This is probably the crucial

Deck-landing trials of a de Havilland Sea Hornet F.20 single-seater.



IN releasing the accompanying notes for publication, the Admiralty state: "The author has been a test pilot for the Royal Navy for a period of eight years, embracing service with the Carrier Trials Unit and Aeroplane and Armament Experimental Establishment at Boscombe Down, finally graduating to Chief Naval Test Pilot at the Royal Aircraft Establishment, Farnborough, where he served for six years in the Aerodynamics Flight, which he eventually commanded from 1947 to 1949. During this service he flew over 2,500 hours in over 200 different types of aircraft. . . . On the purely naval side of aviation he has made some 2,000 deck landings, including the first such landings by a twin-engined aircraft and by a pure jet aircraft, and also by an undercarriageless aircraft on a flexible deck. He has probably also made more catapult launches than any person in the world. For his many feats of flight-testing brilliance he has been awarded the O.B.E., M.B.E., A.F.C., King's Commendation for Valuable Service in the Air, the Silver Medal of the Royal Aeronautical Society and the Boyd Trophy for the most outstanding feat in naval aviation—an unparalleled record in test-flying history."

stage in its extensive Service acceptance trials, for it will suffer treatment such as it will almost certainly never be called on to take again, barring its eventual destruction by some accident-prone pilot.

Eventually, when a satisfactory standard is reached, the Controller of Supplies (Air) will issue a release to the Service, giving the necessary information on how the aircraft or the associated equipment should be used.

Arresting and catapulting trials call for a series of landings into the arrester wires to produce an eventual deceleration of about 4g at up to 15ft off the centre line of the wires at maximum all-up landing weight, and a series of catapulted take-offs up to the maximum-capacity launching speed of the type of catapult used.

The arresting test is designed to check the strength of the arrester-hook installation up to the maximum emergency deceleration likely to be experienced in service, and in addition at a sideload of 1/4 W (W = all-up weight of aircraft) to allow for an error by the pilot in making his touch-down off the centre line of the flight deck. The maximum off-centre distance catered for is 15ft, because any error beyond this by a pilot will almost certainly carry his aircraft over the edge of the deck.

It is surprising what a large percentage of new aircraft fail to pass this test at the first attempt, and it is not always the hook which fails under the strain. I have had aircraft break completely in half, leaving the rear half firmly attached to an arrester wire, and on other occasions the tail unit has warped into corrugations under the effect of side-load. Such disastrous results, needless to say, call for major modification.

These tests, of course, provide an incidental functioning check on the damping apparatus incorporated in the arrester hook to prevent its bouncing on impact with the deck. Since the arrester wire is only some four inches above deck level at the lowest point of droop between its two nine-inch-high supports, the tolerance is small.

This is all, of course, only preparation for the first actual landing of the new aircraft on a carrier, but the tests have been so comprehensive that troubles on the first full-fledged trials are rare.

Skilled deck-landing test pilots carry out such initial landings, but if satisfactory results are obtained the aircraft is handed on to less experienced squadron pilots for intensive working on the deck as a final check on its suitability for Service use.

Between these two phases of deck-landing trials the aircraft will have been put through its final paces in performance, stability and control tests, and preliminary checks will have begun to be made on armament equipment at Boscombe Down.

By this time, too, more than one prototype aircraft will be in existence, so that concurrently with the A. and A.E.E. tests there can proceed at R.A.E. the catapult and rocket-assisted take-off tests.

Initially, the aircraft is launched from the catapult at light weight to enable the maximum acceleration and end-speed to be obtained from the type of catapult used, thus checking the factor limit stresses on the aircraft structure. Here again, failures are quite common, and mainly consist of damage resulting from bottoming (i.e., full compression) of the oleo legs of the main undercarriage and tailwheel or nosewheel as the aircraft squats under the downward pull of the launching strop from the catapult shuttle; the strop strains forward under ever-increasing pressure until finally the tail holdback is released by the breaking of a metal ring at a predetermined load.

The next stage in the catapult trials places the emphasis on the all-up weight, which is increased gradually up to the maximum

service load. Of course, as the aircraft weight goes up so does the catapult end-speed come down, but this latter must not fall below a minimum for safe take-off speed.

The overload conditions, which include the carriage of various types of external stores, will follow as a natural sequence at this juncture, and provide a simultaneous check on the suitability of these stores (e.g., bombs, long-range fuel tanks, rocket projectiles, etc.), and their carriage attachments to withstand the accelerations imposed by the catapult.

Failures are not so common during catapulting as they are in arresting, and usually occur at the overload condition, when bombs may fall off or a torpedo may have its air-tail cut off by the thresh-ing wire launching-strop as it frees itself from the aircraft hook at the end of a launching run.

From time to time peculiarities are met, such as the directional instability of the Sea Fury prototype which left the catapult in a violent swerve; but remedial action is usually simple. In this particular case the fitting of a tailwheel lock was the answer.

We next come to the R.A.T.O.G. tests. Two units are fitted, one on each side, usually located near the trailing edge of the main-plane and arranged so as to give a thrust as nearly as possible through the centre of gravity and along the power-thrust line of the aircraft when the rockets are fired, thus giving the minimum change of long tudinal trim. Each unit consists of a carrier for two, three, or, indeed, any requisite number, of five-inch flashless-cordite rockets, which each produce about 1,200 lb thrust for a period of four seconds.

The tests are, firstly, a functional check on the electrical circuit which fires the rockets, and a check on the suitability of the pilot's firing-button position. Then actual static firing is done so that the aircraft merely moves forward under the impulse of the rockets with the engine idling. Thus, the rigidity of the units on their mountings and the flash effect on the runway and the tail end of the aircraft are noted.

Troubles are most frequent at this stage, due mainly to weak mountings and damage to tailplanes and elevators from pieces of stone, etc., blasted up from the runway by the powerful efflux of the rockets. I have seen a tailwheel-well so full of tarmac that the wheel could not possibly retract into it.

In the good old days of fabric-covered elevators, as on the Swordfish and Walrus it was a common occurrence to set the whole rear end alight, but stressed skin construction has now removed that hazard.

From the static tests we pass on to the full flying tests, which consist of checks on any change of longitudinal trim, measured take-offs at various loads, asymmetric take-off characteristics and jettisoning of the carriers after firing. From the measured take-off tests are produced the information required by the Service for operating R.A.T.O.G. This includes handling notes for the pilot, and firing-distance and unstick-distance charts for various loads and wind-speed conditions under which the particular type of air-craft is operated. The asymmetric tests are designed to assess the effect on directional trim and unstick performance of the misfiring of any number of rockets, up to the maximum carried, on one side of the aircraft.

Finally, jettison tests are made to ascertain the safe speed-range within which the empty rocket cases and carriers may be jettisoned without danger of hitting the tail or otherwise damaging the air-craft. In most cases it has been found that normal slipstream is not sufficient to carry them clear, and elastic bands have to be fitted to them, under tension from the trailing edge of the wing, so that extra downward and outward pull is obtained to give adequate clearance when they are released.

These tests described by no means embrace the full scope of the test-flying programme carried out on naval aircraft at Farnborough, but they are the core of the test syllabus and constitute the essential checks in which failure is totally unacceptable.

NEW HYDRAULIC PUMP

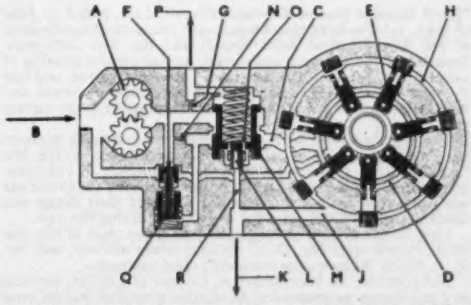
The Dowty "Vardel": Delivery at 4,000 lb/sq in

IN the design of the "Vardel" pump, Dowty Equipment, Ltd., have employed the two-stage principle; the first stage is a gear-pump of light construction, the driver gear being on the same shaft as the second stage, which is a radial seven-plunger unit.

The gear-pump output exceeds the capacity of the second stage, the excess being recirculated through a relief valve. The bulk of the first-stage delivery passes through a control valve to the second stage; from the inlet port, fluid enters each cylinder in turn from an annular gallery, and is pumped *via* non-return valves into the H.P. supply-line.

The sequence of operations is seen below. The gear pump draws from the reservoir at a pressure which might be as low as 1 lb/sq in absolute (at 60,000ft) through inlet B. Delivery is made at 80 lb/sq in to the annulus D, the excess recirculating through relief valve F. A limited quantity is returned to the reservoir through the bleed G, in order to maintain fluid viscosity and temperature at a uniform level. High-pressure delivery from the second stage is made through annulus H to the outlet K. Oilway R transmits delivery pressure to piston L acting against spring load on valve M.

At maximum pressure, piston L causes valve M to seal off the first-stage delivery except for that which passes bleed N and reaches the second stage *via* a by-pass annulus and passage C.



The driving gear of the first pump-stage is actually on the same shaft as the eccentric driving the second stage, although this diagram shows the unit "opened-out" for clarity.

The second-stage plunger-pump is housed in the large-diameter section on the left. The pump is available with American or British mounting flange and drive-shaft.

This flow pressurizes the H.P. circuit until piston L uncovers the escape ports from channel R at full pressure. The fluid then returns to the reservoir *via* the spring housing and passage P.

When the pump is idling, the depression on the inlet side of the second stage—at D—moves the piston so as to enlarge the opening of the relief valve port; this reduces the gear-pump recirculating pressure.

The delivery, at 3,000 r.p.m., is 5 gal/min; this is maintained up to 60,000ft with only a very slight loss in pressure. General characteristics of the pump are shown above. Dry weight, at 13¼ lb, compares favourably with earlier designs dependent upon automatic cut-out valves and accumulators for pressure regulation.

Dowty Equipment state that the factors governing the choice of a two-stage design of this nature were, principally, reduction of plunger-pump output when idling, maintenance of fluid circulation at high altitude and provision of a pressurized supply to the plunger pump. Though the component is chiefly designed for aircraft use, the company point out numerous other applications (such as plastics moulding) in which the pump is finding favour with hydraulic engineers in other industries.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

America and the Flying-boat

YOUR editorial on the flying-boat (February 22nd) is not only interesting but right to the point from the American "Elizabethan" viewpoint. As you know, the Newark, New Jersey, airport was closed due to three bad smash-ups in Elizabeth, a neighbouring town. To prevent similar accidents at other airports, the approach and take-off over water is being used more and more. In other words, the big landing-fields are going to be located in the future as much as possible near water, which will automatically make it convenient for flying-boats to use the same approximate location, using the water itself.

If all airliners flying the Atlantic out of New York were flying-boats, the airport terminals would be greatly relieved of their present congestion. In a few years' time, the flying-boat may be forced to be used in order to allow sufficient space for landing normal cross-continent planes.

New York. R. TOM SAWYER.

Recruiting Labour

MUCH has been said on the subject of housing as an obstacle in the way of recruiting labour for the aircraft industry. This is all painfully true but its solution is, at the best, a long-term one and, as the accent is on urgency, a short cut is required.

Owing to the wide dispersal of the industry, moving house or extensive daily travelling has long been the lot of the aircraft worker. Potential recruits are, doubtless, wise to this aspect, and, as the prospect of the former is slight, the rising cost of daily travelling makes the wisdom of leaving a local job for one in the aircraft industry questionable.

Find a way of reducing the "fares item" in the aircraft worker's budget and you will have your short cut.

London, S.W.9. E.W.S.

Ultra-light Luxury at Low Cost

RECENT discussions on ultra-light aircraft design have caused me to re-read with some interest an article which appeared in an American aviation journal (*Air Trails Pictorial*) in February, 1950. It deals with an editorial air test of the Mooney Mite.

Although now two years old, it does give some indication of what can be achieved in the ultra-light aircraft field. With 26ft 10¼in span and 17ft 7¼in length, the aircraft, a low-cantilever-wing type with semi-cowled 65 h.p. Lycoming, monocoque fuselage, and sliding bubble canopy, has a bare weight of 500 lb, giving a disposable load of 280 lb, enough for 11 gallons of petrol and one of oil, and 40 lb baggage, for which there is ample space.

The aircraft is fitted with flaps which work in conjunction with a "safe-trim" device, the whole empennage being hinged so that flaps are effective for landing and climb as required. The tricycle undercarriage, the nosewheel of which is steerable to 5 deg in either direction, is retractable, by a lever similar to a car hand-brake; this was rather difficult to operate but could have been (and probably now has been) improved by a better lever system. Very little weight penalty is incurred for the device, the wheels folding into wells. This, no doubt, is partly responsible for the exceptional performance—speed range from 36 m.p.h. to 138 m.p.h., with between 115 and 125 m.p.h. cruising, for 35/40 m.p.g., and an initial rate of climb of 1,300ft/min; the Mite tested at 730 lb was airborne in less than 100 yd, and at 6,000ft in six minutes.

The cockpit is roomy, and radio is fitted, as are A.S.I. altimeter, compass, tachometer, oil pressure, temperature, and fuel gauges. Carburettor- and cabin-heaters are standard equipment, and several positions from full open to fully closed are adjustable for the sliding hood.

The pilot was very enthusiastic about the flying qualities of the Mite; he reported good handling, manoeuvrability, and excellent stall delay and recovery.

Such qualities imply a millionaire's toy, far beyond the reach of the average enthusiast, but this is the greatest surprise of all: the Mite then cost a mere $1,995, which, working at the old exchange rate of $4.18 to the £ (which we must do to get a true value, the new rate of $2.80 being a special measure designed to meet a specific crisis largely caused by winning a war) gives about £477 6s—unless my slide rule has warped under the shock!

Cambridge. PEDANTICA.

The ex-B.O.A.C. Solents

REFERRING to your remarks on page 222 of the February 22nd issue of *Flight*, regarding the ex-B.O.A.C. Solents, these aircraft were, I believe, taken over by an organization known as International Aircraft Sales, of which John Alcock, ex-B.O.A.C., was a director. I understand that three of the Solents were sold to Trans-Oceanic Airways in Sydney; one of them crashed at Malta on the way over from U.K., and a second one hit a dredger in the Brisbane River, Queensland.

Flying-boat operators in Australia at present are: (i) Qantas Empire Airways, with Sandringhams to the Pacific Islands and Catalinas in New Guinea; (ii) Trans-Oceanic, with Sunderlands and Solents to New Guinea, Lord Howe and Hobart; (iii) Barrier Reef Airways—Sandringhams and Catalinas to the islands of the Barrier Reef; (iv) Tasman Empire Airways—Australia and N.Z.

Singapore. HYDRAVION.

[We understand that several more of the Solents have been disposed of since this letter was written.—Ed.]

No. 58 Squadron—Information Wanted

I AM collecting material for a history of No. 58 Squadron, and would like to appeal through your paper for ex-members to send me photographs and memoirs. The former will be carefully copied and the originals returned; the latter are welcome in any form. It is easy to obtain the official skeleton of a squadron history; it is very difficult to clothe it with the flesh and blood of reality. So everything is wanted—the spirit prevailing in work, sport and social life, the humorous stories and the serious ones, blacks and prangs, gongs and praise.

The Malt House,
Benson, Oxon. JOHN BISHOP (S/L. J. G. Bishop, D.F.C.)

D.H. PROPELLERS AND MISSILES

"I AM now permitted to disclose that for some time we have been actively engaged in projects of the utmost importance in the field of guided weapons." This statement from the chairman's address at the annual general meeting of de Havilland Propellers, Ltd., held recently at Hatfield, is the first reference to an activity which may eventually become even more important to the company than the development of airscrews.

The year under review was reported to be the best trading year the firm had yet experienced. A greatly increased programme was planned for the current year and Mr. W. E. Nixon, chairman of the board, expressed confidence in the company's ability to meet it. He was glad that much current work was against contracts for civil air transport at home and abroad; new airscrews, mostly for turbines, were progressing well, while flight-trials of hollow-steel-bladed airscrews had been satisfactory.

The production plant at Lostock was full to capacity and a new factory had been taken in Bolton. With regard to machine-tool and material deliveries, the position was "fairly satisfactory," while the shortage of skilled labour was a little less acute.

A new departure during the year had been the manufacture of electronic equipment for the company's own laboratories and for industry—principally for stress- and vibration-measurement.

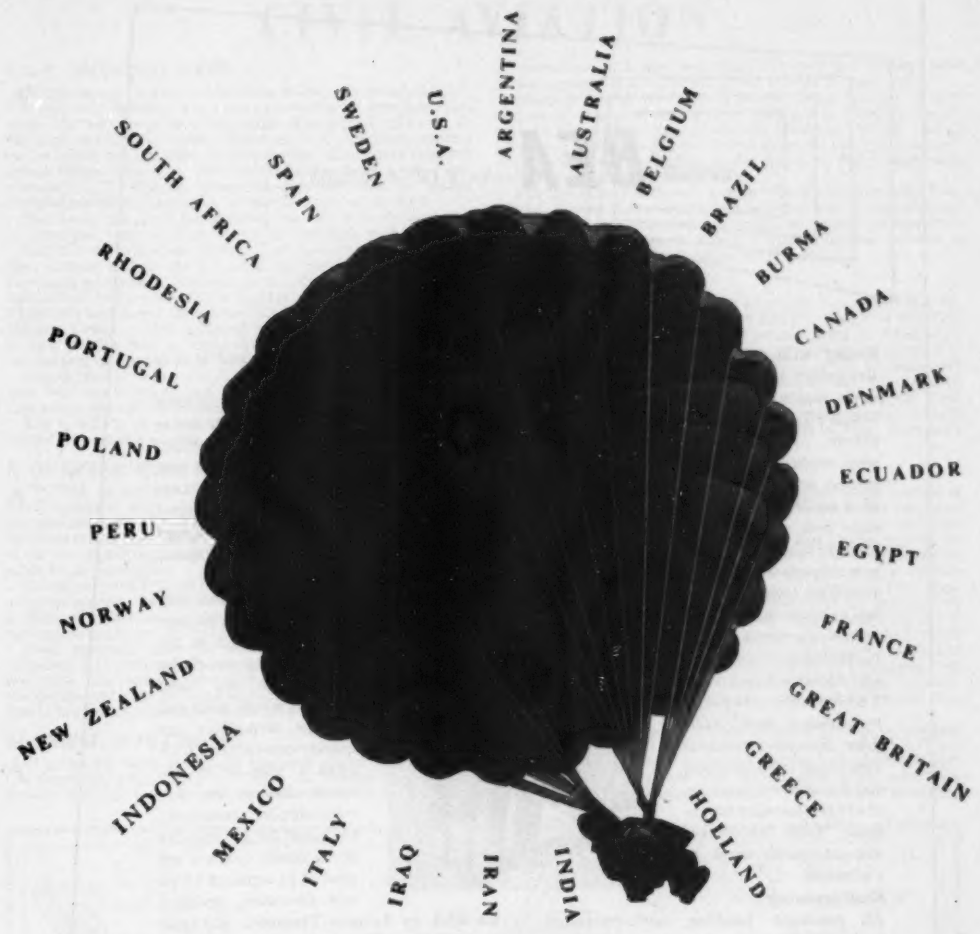
WESTLAND RESULTS

THE financial year of Westland Aircraft, Ltd., ended on June 30th, 1951, was principally a period of production-development of the Wyvern naval strike aircraft and the S-51 helicopter. Speaking at the sixteenth (adjourned) annual general meeting of the company last week, the chairman, Lord Aberconway, said that this fact was reflected in the value of the company's stocks and work-in-progress—which had increased still further in the current year.

The Westland-Sikorsky S-55 helicopter was now being prepared for production at Yeovil, and orders were coming in; the first "Anglicized" S-55 was expected to fly this summer. Lord Aberconway spoke of the large backlog of orders held by the subsidiary company, Normalair, Ltd., who had increased their design and development staff and extended their works during the year.

New Westland directors appointed since the close of the year under review were Mr. D. C. Collins, works director, and Mr. D. L. Hollis Williams, the company's chief engineer.

Net profit for the year marked an increase of £29,731, standing at £71,985; the recommended dividend of 5 per cent was the same as the figure paid the previous year. At an extraordinary general meeting which followed the A.G.M., a resolution increasing borrowing powers from £600,000 to £1,000,000 was adopted.



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INSIDE **BEA** *No. 6 OF A SERIES*

Every minute counts To pass travellers quickly and easily through all formalities at the beginning and end of their air journey —that's the aim of BEA's passenger handling system. Movements have been planned with mathematical precision to avoid congestion and delay—with such success that, even on INTERNATIONAL services, the time now needed at an airport for the traveller to show his ticket, pass through Customs examination, baggage weighing, passport and currency control, out to the aircraft has been reduced considerably. How has it been done? Three reasons: adequate, well-trained staff; carefully devised routing at airport and town terminal; and the stop-watch timing of every passenger movement. Even loudspeaker announcements work to a schedule.

Staff training All passenger handling staff (recruited locally wherever possible) go on an introductory training course when they first join BEA. Here they learn the routine of all duties: from booking procedure and completion of passenger and freight documents, to catering and accountancy. Air stewards and stewardesses are trained on a different six-week course with an intensive syllabus which includes first aid, air duties, and compilation of flight papers. The passing-out standard is very high.

Interline passengers Many travellers from the provinces and the Continent arrive at Northolt to connect with other airlines operating from London Airport, and *vice versa*. Special arrangements for these passengers are made so that they can travel between airports in BEA coaches. Luggage is carried unexamined, under Customs seal.

Transport About one-third of all BEA passengers arrive direct at the Airport. The remainder assemble at the town terminal, where ticket and baggage formalities are quickly completed. BEA owns a fleet of 58 18-seater coaches for terminal-airport transport; too small for present-day needs, these coaches are soon to be replaced by 60 new 37-seaters, designed for BEA by London Transport, and built on AEC Mark IV chassis. It is hoped that the first will be delivered in April this year.

Passenger facilities Ten minutes to wait? A magazine? Traveller's cheques? A quick snack? A feature of BEA airports and town centres are the lounges with bookstalls, information desks and licensed buffets to cater for a traveller's needs. No split-second timing here—but still an essential of BEA passenger service.

BEA

BRITISH EUROPEAN AIRWAYS

CIVIL AVIATION

L.A.C. BUYS SKYWAYS

AN agreement by which Lancashire Aircraft Corporation, Ltd., take over Skyways, Ltd., was expected to be completed this week. By this arrangement Lancashire Aircraft will take over all Skyways' 5s Ordinary shares. Brig-Gen. A. C. Critchley remains on the board, but the other directors resign. Lancashire directors David Brown (chairman, who joined the Lancashire board last summer); J. E. Rylands (managing director); and Sir Wavell Wakefield (contract manager), become directors of Skyways.

The future policy for the company has still to be decided, but its principal work of maintenance at Stansted will continue.

Only two aircraft—both without C. of A.—are concerned in the deal, namely, a York and a Lancastrian, the DC-3s which were previously operated by Skyways in the Middle East having been sold to Gulf Aviation some little time ago. Skyways' Stansted base, which was transferred from Dunsfold (now used by the Hawker Siddeley Group) is well equipped for the overhaul of Yorks and, as these aircraft form an important part of the Lancashire fleet, one purpose of the purchase becomes apparent.

Approximately 20 per cent of the shares of Morton Air Services were held by Skyways, and these are now taken over by the Lancashire Aircraft Corporation.

The L.A.C. is at present operating a Blackpool - Isle of Man service four times a week in association with B.E.A.

A QUARTER FLEW

A TOTAL of 1,775,000 passengers flew to or from the United Kingdom in 1951, an increase of 24 per cent compared with the previous year. The 1951 figure represents 25 per cent of all travellers to and from the U.K., although in the last three months of the year 32 per cent of all journeys to or from the country were made by air passengers.

During the year 873,000 air passengers arrived in the U.K. and 902,000 departed, compared with 710,000 and 723,000 respectively in 1950. Air traffic on the continental routes showed the greatest increase, rising by 30 per cent to 1,054,000.

Total passenger journeys, sea and air, during 1951 were 7,099,000, a 12 per cent increase over 1950 or 35 per cent increase over 1938. Sea journeys were up 8 per cent compared with 1950 and for the first time since the war exceeded the 1938 level. The figures have been announced by the Board of Trade.

BURMESE MARATHONS

AN order for three Marathons has been placed with Handley Page (Reading), Ltd., by Union of Burma Airways for delivery later this year. The aircraft will have accommodation for 18 passengers and they will have increased fuel tankage with a total capacity of 410 gallons, giving a range of 1,400 miles.

Union of Burma Airways is at present flying domestic services and an international service from Rangoon to Bangkok, mainly with DC-3s, but it is reported that the Marathons will be used on services to India and Malaya as well as on the route to Thailand. A stewardess will be carried on the Marathon flights and meals will be served from the small buffet.

The Marathon has already been in scheduled service with West African Airways and during a demonstration tour of Australia and New Zealand some scheduled passenger and freight services were operated with this type on behalf of Qantas Empire Airways in New Guinea and in New Zealand for N.Z.N.A.C.

K.L.M.'s LOSS

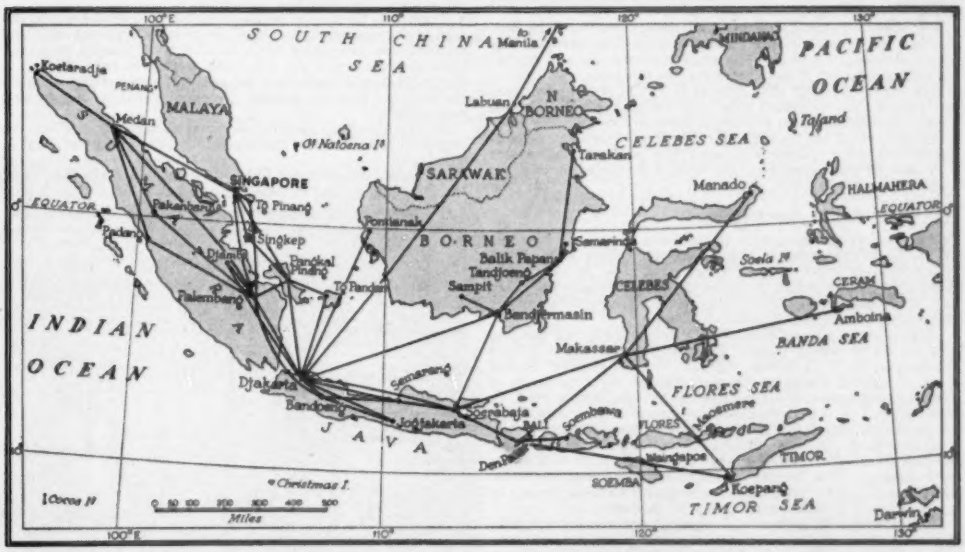
IT is with regret that we have to record the loss of two K.L.M. aircraft during last week-end. On Saturday the DC-6 PH-TPJ, *Koningin Juliana*, on a flight from Johannesburg to Amsterdam crashed and caught fire while making an instrument approach to Frankfurt Rhine-Main Airport. Forty-four of the 37 passengers and 10 crew lost their lives. On Sunday the Constellation PH-TFF, *Venlo*, was burnt out at Bangkok on a flight from Amsterdam to Sydney. In this case the aircraft is reported to have caught fire in the air and to have made a crash landing. Passengers and crew were unhurt.

PROGRESS IN INDONESIA

AVIATION in the United States of Indonesia seems assured of a good future. The large number of islands scattered over a vast area make air transport essential. K.N.I.L.M., the East Indies offshoot of K.L.M., developed the first air transport in the area over a number of years before the war and, after the liberation from Japanese occupation, K.L.M. re-opened essential services until the formation of Garuda Indonesian Airways in Dec. 1949.

This Indonesian company, whose operations are managed by K.L.M., operates an extensive network within the islands and to Singapore and Manila. The present fleet consists of 10 Douglas C-47As converted by Canadair to seat 21 passengers, 12 C-47As used for freight or having accommodation for 27 passengers, four 13-passenger Convair PBY-5A amphibians and eight Convair-Liners; and, as recorded in *Flight* last week, an order has just been placed for 14 de Havilland Herons.

Unfortunately the lack of trained personnel is a severe handicap to the rapid expansion of aviation in Indonesia, but I.C.A.O. has sent a mission to Djakarta to assist in training Indonesian nationals in air-traffic control, radio and meterological work, aerodrome construction and aviation engineering. It is also hoped to start an



INDONESIAN AIRLINES : The routes of Garuda Indonesian Airways referred to above. Air Ceylon, B.O.A.C., K.L.M. and Q.E.A. also serve Djakarta.

B.E.A.'s BULKY BRISTOL: This Bristol 170, seen here at Northolt Airport, is used by B.E.A. for the transport of aircraft spares and for certain freight operations.

CIVIL AVIATION . . .

Indonesian flying school, and the Ministry of Supply has already authorized the release of eight Chipmunks for use when the school is opened.

The I.C.A.O. mission to Indonesia, when at full strength, will be the largest in the field and it will cover most aspects of civil aviation. W. C. B. L. T. Barton, O.B.E., is in charge of the mission and the other members are from Australia, Denmark and India. The Indonesian Minister of Transport and Communication, Dr. R. Djuanda, is responsible for aviation and he has agreed to an expansion programme to bring 49 aerodromes into service as soon as possible in order to give the islands a full system of feeder services.

HEAVY BRAZILIAN TRAFFIC

DURING 1951, the 36 principal Brazilian airports handled 4,023,192 passengers, 6,743,470 lb of mail and 110,287 tons of freight. Congonhas, Sao Paulo, the busiest Brazilian airport, handled 71,261 commercial aircraft movements and 1,002,793 passengers. The second busiest was Santos Dumont at Rio de Janeiro with 60,238 aircraft movements and 906,683 passengers. The next busiest, in order, were Porto Alegre, Curityba, Salvador and Recife.

A new passenger terminal was opened on February 1st at Galeao, the Rio de Janeiro international airport, which is also an air force base.

$7,000,000 FOR K.L.M.

THE World Bank announced last week, that a loan of $7 million, guaranteed by the Netherlands Government, was being granted to K.L.M. to help the company replace part of its fleet.

The bank said that K.L.M. was re-equipping its fleet in order to handle an expected increase in traffic over the next few years, to maintain its competitive position among international airlines and to improve its dollar-earning capacity.

The airline is expected to spend about $33 million in its programme which includes the purchase of 23 U.S. aircraft. The loan will finance about 20 per cent of the total cost and the remainder will be met from the airline's own resources.

The present K.L.M. fleet consists of 17 L-749 Constellations, six DC-6s, 12 Convair-Liners, 10 DC-4s and 20 DC-3s. Orders have already been announced for nine L-1049 Super Constellations and seven DC-6Bs. Dr. Plesman's known interest in airline helicopter operation suggests that passenger helicopters may also be purchased from the United States when they are available.

AT THE S.A.E. MEETING

THE Society of Automotive Engineers is to hold its National Aeronautic Meeting and Technical Air Review at the Hotel Statler in New York City from April 21st to 24th. At a dinner on April 23rd H.R.H. Prince Bernhard of the Netherlands will speak on "The Importance of Europe in the Co-operation of the Atlantic Countries with Respect to Aviation."

Among the commercial-aviation contributions to the meeting will be the following papers: Progress Report on the Allison Turboliner, by D. J. Nolan, Allison Division, General Motors Corp; Improved Passenger Comfort through the Application of Airline Experience to Air Conditioning System Design, by E. S. McCarthy, T.W.A.; Turboméca-Continental Engine Test Plant, by Bo Hoffström, S.A.S.; Introduction of New Transport Aircraft, by R. C. Morgan, B.E.A.; Operation and Economics of English Channel Aerial Ferry, by A. Cdre. G. J. Powell, Silver City Airways; The Impact of Turbines on Airlines, by E. A. Driessen, K.L.M.; and Control of Aircraft Ground Noise, by L. L. Beranek, Roland Bourne and J. V. Bernardo.

An international review of aviation engineering progress, featuring advanced designs of aircraft, power-plants and airscrews, will be held at New York International Airport, Idlewild, on April 24th.

25,000,000 U.S. PASSENGERS?

IN 1951 United Air Lines realized the highest net earnings in their history, amounting to $8,563,097 (about £3,058,248) after payment of taxes. This figure, equal to $3.58 per common share after preferred dividends, represents a 33-per-cent. increase over 1950 net earnings, which were $6,429,723, or $2.90 per share. The earnings per common share are after giving effect to the conversion of 51,921 shares of preferred stock into 221,892 shares of common stock during the year.

During the year United reduced its operating cost per revenue ton-mile to 44.3 cents, compared with 45.6 cents in 1950. Revenue passenger-miles totalled 1,868,770,142, express ton-miles 9,881,845, mail ton-miles 19,094,986, and freight ton-miles 22,724,520.

Mr. Harold Crary, vice-president (sales), has forecast that 25,000,000 passengers will fly on U.S. scheduled airlines in 1952, and stated that U.S. airlines have on order $250,000,000 worth of new aircraft. U.A.L. have ordered 40 Convair 340s, while two new DC-6Bs will bring the DC-6B fleet to 64.

U.K. ACCIDENTS IN 1950

THE Ministry of Civil Aviation has recently published a survey of accidents involving U.K.-registered aircraft during 1950. There were 51 notifiable accidents to such aircraft, of which two were helicopters and three gliders. Twenty were officially investigated, three being the subject of public inquiries.

An analysis of the information is given in the table at the foot of this column. If at first the totals of fatalities seem a little startling, it should be remembered that in road accidents in Great Britain during the same period 5,012 persons were killed and 196,313 injured—not, of course, that any direct comparison is intended or possible.

Eight accidents occurred through faults in some part of the power plant and accessories; one of these was caused by the weakening of a critical part by the maker's identification mark. In another accident a fault was allowed to develop although it had been recognized in an earlier series and safeguarded by suitable inspection schedules. Of the remainder of accidents in this category, four were not accidents in the generally accepted sense, but were engine fires in four-engined aircraft, all of which were successfully extinguished in the air. There were two other cases of engine fire, the cause of one being undetermined.

Stalling or spinning was a feature of seven crashes, the most prevalent single cause being the failure of the pilot to maintain adequate flying speed in normal flight conditions. Two accidents occurred during take-off from small fields in which successful precautionary landings had been made.

There were three more collisions with high ground, bringing the total in this category since 1946 to 20. One occurred while the machine was descending to an aerodrome with radio range and D.F. assistance, and the remainder during *en route* flights. A fourth accident classified as a collision with terrain occurred when the aircraft struck the runway during a missed landing in very poor visibility.

An "accident" not included in the 51 mentioned above was the explosion of an "infernal machine (*sic*)" in the lavatory of a B.E.A. Viking.

Accidents classified by phase of operation (excluding those involving gliders) were: Taxying, 2; initial climb, 6; climb after

ACCIDENTS TO U.K.-REGISTERED OR OWNED AIRCRAFT, 1950

Nature of Flight	No. of acc.	No. of acc. (fatal)	Crew K.	Crew S.I.	Crew I.	Crew Sl. I.	Crew U.	Passengers K.	Passengers S.I.	Passengers I.	Passengers Sl. I.	Passengers U.
Scheduled pass. transport...	7	2	7	2	—	—	36	49	1	—	—	79
Non-sched. pass. trans. ...	3	2	6	—	—	—	1	78	1	2	—	4
Non-sched. freight trans....	6	2	8	5	1	—	12	—	—	—	—	—
Commercial	4	1	1	1	1	—	—	1	—	—	—	—
Positioning	1	—	—	—	2	—	—	—	—	—	—	—
Club and group flying ...	10	1	1	1	—	2	6	—	—	—	1	2
Instructional	2	—	—	1	—	1	—	—	—	—	—	—
Check, conversion, familiarization	1	—	—	—	—	—	8	—	—	—	—	—
Experimental, Development, Calibration ...	3	—	—	—	—	—	10	—	—	—	—	1
Test	5	1	4	—	—	1	13	—	—	—	—	3
Private	6	4	4	1	—	1	—	2	—	—	—	1
Gliding	3	1	1	1	—	—	1	—	—	—	—	—
Totals	51	14	32	12	4	5	87	130	2	2	1	90

Abbreviations: K = killed; S.I. = seriously injured; I. = injured; Sl.I. = slightly injured; U. = uninjured.
Note: One additional entry, "Third parties = 4 slightly injured," is quoted against the "Club and group flying" line.

take-off, 4; *en route*, 9; landing procedure, 1; final approach, 3; landing run, 9; missed landing, 1; miscellaneous, 13.

Classification of accidents according to the nature of the flight, together with details of injury sustained by the occupants, appears in the table already referred to. The full report, M.C.A.P. 98, is obtainable from Her Majesty's Stationery Office, price 1s.

AIRWAYS (INDIA) BUILDS UP

INDIAN air traffic increases are well illustrated by the 1951 figures for Airways (India), Ltd. More than 110,000 passengers and over 31,000,000 lb of freight were carried in the year. The passenger figure shows an increase of about eight per cent over 1950 and the freight load is over half the total carried by the airline since it began operations in September, 1946.

Airways (India) have an unduplicated route-mileage of 4,039, connecting 14 cities in India and one in East Pakistan; 303,000 passengers and 61,000,000 lb of freight were carried between September, 1946, and the end of 1951, and 104,000,000 passenger-miles were flown.

On December 22nd last year the company began to operate the first tourist-class air service in India, when it inaugurated its thrice-weekly "Airist" 28-passenger DC-3 flights between Gauhati and Delhi *via* Bagdogra, Patna, Cawnpore and Agra.

PILOTS TALK DOWN UNDER

THE seventh Conference of the International Federation of Air Line Pilots' Associations will be held in Sydney, N.S.W., from April 15th to 19th at the invitation of the Australian Air Pilots' Association. Subjects of discussion will include altimeter settings, the accuracy of meteorological forecasts, controlled flight and aircraft performance.

The conference will also study reports from Federation representatives who have attended the following meetings of I.C.A.O.: Fourth Session, Operations Division; Third Session, Search and Rescue Division, AGA Meeting on Approach Lighting; Second South American South Atlantic Regional Air Navigation Meeting; Fourth Session, Personnel Licensing Division; and Third European Mediterranean Regional Air Navigation Meeting.

The chairman of the conference (which is the first the Federation has held outside Europe) will be Capt. B. C. Frost. British delegates will be Capt. C. G. Klimcke, vice-chairman of B.A.L.P.A., and Capts. P. E. Bressey and T. H. Farnsworth, technical representatives of B.A.L.P.A.

The Federation was founded in London in April 1948 and now numbers among its members 20 airline pilots' associations, representing about 9,000 pilots employed by 60 to 70 operating companies in 18 countries throughout the world.

BREVITIES

AN air agreement covering reciprocal services between Madrid and Brussels was signed in Madrid last week between Spain and Belgium.

* * *

Mr. Edward G. Walton, a Shakespearean actor and authority on English as spoken by Americans and Frenchmen, is now teaching K.L.M. pilots to understand English as it is spoken by radio operators throughout the world.

* * *

California Central Airlines, using a fleet of Martin 2-0-2s, has carried 52 per cent greater passenger traffic in January this year than in the same month last year. In spite of the fact that January is normally a bad traffic month, 3,431,274 passenger-miles were flown, compared with 2,345,625 in January, 1951.

* * *

At Burnley County Borough Magistrates' Court last week, Frank Edwin Hargreaves and Hunting Aerosurveys, Ltd., were each fined £10, plus costs of £4 4s each and special costs of £11 1s 6d between them, for contravening certain articles and rules of the Air Navigation Order, 1949. It was alleged that on August 14th, 1951, they had flown an Auster Autocrat, G-AJEB, at less than 1,000ft above the highest obstacle within a radius of 2,000ft. at Burnley.

2,000 YEARS IN INDIA: This view of part of the Air-India booking office in Bombay shows some of the wall decorations, which are based on the over-2,000-year-old groups of paintings found in the Buddhist and Brahmanical caves at Ajanta and Ellora near Hyderabad.

British European Airways' Elizabethan aircraft R.M.A. *Sir Walter Raleigh*, made a proving flight to Copenhagen and Stockholm on March 18th-19th.

* * *

Nicosia Airport in Cyprus is now open for four-engined aircraft after having been closed for repairs from December 6th last year. Tymbou, eight miles from Nicosia, has been used meanwhile.

* * *

The resignation, as from April 15th, of M. Stephane P. Thouvenot from his post as Deputy Director of I.A.T.A. in Montreal has been announced by that Association. A General of Engineers in the French Air Force and Honorary Director of Air Navigation and Air Transport in the French Ministry of Public Works, M. Thouvenot will return to Paris.

* * *

The Nordic Parliamentary Committee for Free Inter-Communications has proposed the abolition of passports for Danish, Norwegian and Swedish nationals visiting one another's countries. A second stage of this scheme, scheduled for next year, is designed to require passport control for non-Scandinavians only when they first enter Scandinavian territory.

* * *

Sabena will start tourist-class services between Brussels and New York on May 1st. DC-6s will be operated thrice weekly with combined standard and tourist-class accommodation. Tourist-class passengers will be accommodated in the main forward cabin of the DC-6s and standard-class passengers will occupy the rear cabin. On June 15th, Sabena will add a weekly DC-4 all-tourist class flight, and from July 1st there will be three DC-4 and one DC-6 all-tourist flights in addition to two standard-class DC-6 services every week.

* * *

Trans-Canada Air Lines have appointed Capt. George Lothian as their superintendent of flying. Capt. Lothian, who is one of Canada's senior airline pilots, began flying in 1929; he was a bush pilot with Canadian Airways and one of the first T.C.A. pilots, having joined the company soon after its formation in 1937. Formerly he was chief pilot of T.C.A.'s Atlantic region; he has made over 350 North Atlantic crossings (many with R.A.F. Transport Command) and flown over 2,000,000 miles.

* * *

At the recent annual general meeting of the Aerodrome Owners' Association the executive committee for 1952, composed of eight municipal and eight commercial members, was elected as follows:—Blackpool Corporation; Leeds-Bradford Joint Aerodrome Committee; Bristol, Cardiff, Coventry, Luton, Manchester and Newcastle-upon-Tyne Corporations; Airports, Ltd., Airways Union, Ltd., British Air Transport, Ltd., Fairey Aviation, Ltd., Handley Page, Ltd., Marshalls Flying School Ltd., Short Bros. and Harland, Ltd., and Sywell Aerodrome, Ltd. The retiring vice-chairman, Mr. A. G. Douglas, was elected chairman, with Alderman R. Mould-Graham, O.B.E., M.C., T.D. (Newcastle-on-Tyne Corporation) as his deputy.

CIVIL AVIATION . . .

FROM THE CLUBS

GEMINI WITH A DIFFERENCE: The Hon. Max Aitken's Gemini IIIB, to which reference is made on page 356 of this issue. Similar to the Gemini IIIA in that it has Gipsy Major 10 engines, this aircraft is fitted with split flaps.

READING the chairman's 1951 report at the annual general meeting of the Royal Aero Club last week in the absence of Mr. Whitney Straight, Mr. S. Kenneth Davies (vice chairman) said that the Records, Racing and Competitions Committee, under the chairmanship of Major Mayo, had distributed over 1,000 entry forms to all parts of the world for the 1953 England-Christchurch Air Race. Great interest was being taken in the event, which was assuming a rôle of great significance.

The report continued: "The Royal Aero Club owes a great debt to Viscount Kemsley, who through the Kemsley Flying Trust has so generously contributed to the sport of aviation and especially to the gliding movement in this country." The Trust would support an ambitious meeting once again this year, when the National Air Races would be flown at Newcastle-upon-Tyne on July 11th and 12th. Mr. Davies went on to say that, despite the ever-increasing cost of living, air racing had so far not shown any decline in popularity.

The report paid tribute to the way in which the R.Ae.C. Air Touring Department had been constantly engaged in efforts to overcome the increasing recession in private flying. Although the activities of private pilots did not appear noticeably less, the number of Customs Carnets issued showed a marked decrease; the 1951 figure of 536 compared badly with that of 921 in 1947; this was undoubtedly attributable to the general economic and financial situation. In an endeavour to encourage more air touring, the R.Ae.C. had recommended to the F.A.I. in 1950 that a one-journey carnet should be introduced. The proposal was approved and this carnet was now available for British pilots. Valid for three months, it cost only £1 and entitled the holder to fly overseas, tour in one country and return to the U.K.

Mr. Davies went on to say that the R.Ae.C. was considering the issue of four classes of Royal Aero Club Pilots' Certificates as an incentive and as a recognition of experience above the P.P.L. standard.

Other points mentioned in the report were that Club membership—there had been a slight increase in the number of associate members—now stood at 1,880, and that the accounts again showed a slight surplus for the year. This latter point reflected credit on all concerned and particularly on Col. Devereux and the Finance Committee.

Mr. Whitney Straight's report concluded with the words: "I have had the honour and privilege of serving you as chairman for the past six years. I now think it is time for someone else to take my place, and consequently I am not seeking re-election for the forthcoming year. Your committee will elect a new chairman at their next meeting."

A GENERAL meeting of the Ultra Light Aircraft Association is to be held at White Waltham Aerodrome at 11 a.m. on Saturday, May 3rd. This happily coincides with the second rally of the Vintage Aeroplane Club and may well result in both organizations gaining new members, for there is inevitably a close connection between the two.

IT is now officially announced that the *Daily Express* South Coast Air Race—which, as recorded in *Flight* recently, is to take place on August 2nd—will be held at Shoreham. Organized on lines approximating to those of last year, the race will start from Shoreham Airport, cover a similar course, and finish at Brighton West Pier. Further particulars will shortly be available from the Royal Aero Club.

THE Fair Oaks Flying Club has so far this year logged a total of over 300 hours on its fleet of Tiger Moths, Magisters and Autocrats. During January, five Private Pilots' Licences were awarded; another was gained in February, and two more pupils will shortly be taking their tests.

All these licences were gained by A.T.C. cadets. It appears that ordinary members—as at most other clubs—take anything from three months to three years to gain their P.P.L.s; as if this were not enough, Fair Oaks—once again in company with many other clubs—are seriously considering having to raise the present instructional rate of £3 an hour, in view of the increased cost of petrol. The A.T.C. cadets are completing their training up to licence standard in something like 35 hours over a period of sometimes less than a month—an achievement of which Mr. Arthur, the C.F.I., is justifiably proud.

The secretary of the club has intimated that a flying display similar to that held last year is to be staged during the coming season; particulars will be announced later.

Air Racing Championship

THE Royal Aero Club announces a very practical incentive for pilots to enter more races during the coming season: it takes the form of a system whereby the British pilot who scores the greatest number of points in nominated races during 1952 will be declared British Air Racing Champion. With this title will go the award of the Royal Aero Club Jubilee Trophy and £100; the two runners-up will receive £50 and £25 respectively. The club hopes that this innovation will encourage greater interest in air racing and attract a considerably larger number of entrants.

Briefly, the championship involves the award of points, proportional to the number of starters and based on the place attained in each of certain races. The nominated events are the Goodyear Trophy (Wolverhampton, May 17th); Grosvenor Challenge Cup *or* Norton-Griffiths Challenge Trophy *or* Kemsley Challenge Trophy *or* Air League Challenge Trophy (Newcastle upon Tyne, July 11th); King's Cup (Newcastle upon Tyne, July 12th); *Daily Express* Trophy (Shoreham, August 2nd); and the Siddeley Challenge Trophy (Baginton, August 23rd).

Pilots need not fly the same aircraft in each of the races, nor need they compete in all of them, though to be eligible for the championship they must compete in at least two. If a race is flown in heats, points will be awarded only to those pilots who finish in the final. The trophy will not be awarded unless a minimum of three of the nominated races takes place.

The nominated races will be classified as "A," "B," "C" or "D," depending on the number of starters in each, e.g. an A-category race will be one in which six or fewer aircraft start; B, 7-15; C, 16-30; D, 31 and over. Twelve points will be awarded to the winner of an A race, 17 for a B, 22 for a C and 27 for a D.

Applying this system to the 1950 season, the results would have been: Dunkerley, 79 points; Somers, 72; Rush, 69; and Paine, 60. In 1951 the scoring would have been: Wood, 45; Paine, 42; Hayhow, 40; and Jemmett, 31.

Thus the pilot who is finally declared champion will in effect be the one who has attained the highest average placing throughout the year. The result of each of the nominated races will indicate how far each pilot is towards winning the championship.

FORTHCOMING EVENTS

Apr. 4. College of Aeronautics: Senior Common Room Society's Annual Dinner.
Apr. 6. London Aeroplane Club: Dawn Patrol and A.G.M.
Apr. 15. R.Ae.C.: Film Show.
Apr. 21-24. S.A.E. Aeronautic Meeting, New York.
Apr. 22. R.Ae.S. Graduates' and Students' Section: "Servomechanisms." by F. H. Borlace, B.Sc.(Eng.), Grad.R.Ae.S.
April 22-24. R.A.F. Golfing Society: Spring Meeting, Walton Heath.
Apr. 24. R.Ae.S.: "Fuel Systems for Turbine-driven Aircraft," by J. E. Walker, A.F.R.Ae.S. (at Luton).
May 3. Vintage Aeroplane Club: Rally, White Waltham.
May 3-10. F.A.I.: Committee Meetings, Madrid.
May 5. I.A.T.A.: Fifth Annual Technical Conference, Copenhagen.
May 5-16. British Industries Fair.
May 10. Exeter Aero Club: Display.
10-11. l'Association des Amis de l'Aumoneries de l'Air: Cathedrals Rally.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

SPITHEAD DISPLAY: Blackburn Firebrands and Vickers-Armstrongs Supermarine Attackers ranged on the flight deck of H.M.S. "Eagle," ready to proceed with the working-up programme recently demonstrated in the Channel. An account of the flying appears on pages 340 to 342.

C.A.S. at Charterhouse

ON Friday last, Marshal of the Royal Air Force Sir John Slessor inspected the Charterhouse contingent of the Combined Cadet Force. After the inspection, speaking on the R.A.F. as a career and of National Service, Sir John said, "The primary reason for building up our fighting forces—which we cannot do without the National Service system—is not to get ready to fight another world war, but to *prevent* another world war. I think myself we have a jolly good chance of doing so—I do not believe that World War III is just round the corner. But we certainly shall not do so unless we are steadfast and brave, resolute and patient and ready to accept the necessary sacrifices of time and leisure and comfort.

"It depends partly on you," he continued. "If you enter on your two years' National Service determined to hate it and do as little as you can, then you'll get no good out of it. But if you are that sort of chap you'll probably get no good out of any job. If you come into the Service determined to make the best of it, to give the best that is in you, then I believe you'll be a much better chap in after life than if you had not given those two years to the country."

Turning to the subject of the expansion of the R.A.F., Sir John said: "The only thing that worries me about our ability to do what we have set out to do is a shortage of good officers as pilots and navigators. I hope some of you will be going through Cranwell into the Regular Service. Others, who may not be certain whether they want to make the Service a career, I hope will come in on the short-service commission with the aim of getting a permanent commission. But others who have only their two years' National Service to do, I hope will come and do it with us as pilots. We are really in need of good young officers with the tradition of Service and leadership—the type that you get in a school like Charterhouse—to carry on the great traditions that the R.A.F. has established in its short 35 years of existence."

Australia to Borrow "Vengeance"

SPEAKING at the opening of a new naval leave centre, Mr. Menzies, the Australian Prime Minister, announced that Britain had agreed to lend the light fleet carrier H.M.S. *Vengeance* to the Royal Australian Navy, pending the completion of H.M.A.S. *Melbourne*, which is now being built in the United Kingdom.

An Australian crew of about 500 officers and ratings will take over *Vengeance* in Britain next November. Capt. H. M. Burrell, R.A.N., who is at present the assistant Australian defence representative, will be in command.

The Australian government has asked for the loan of the carrier because it was felt necessary to have two carriers ready for any emergency and also to develop the air component of the R.A.N.

Cold War Training

A WEEK ago today nine R.A.F. officers left Lyneham for Oslo to spend 14 days on a cold weather survival exercise. The visit is being made at the invitation of Hans Nansen, nephew of Dr. Nansen the explorer, who is placing his mountain lodge near Tisleia at the disposal of the R.A.F. party. Tisleia is about 115 miles north-west of Oslo. Mr. Nansen is acting as instructor.

W/C. D. G. Lyster, of the Air Ministry Directorate of Operational Training, is in charge of the party, which includes S/L. D. C. Saunders, F/L. I. L. H. Ramage and F/L. P. Coventry from Bomber Command, F/Os. P. E. Pullan and W. T. Ansell from Transport Command and F/L. R. Bowie from Fighter Command.

Arctic Training Flights

NEXT Sunday four Lincolns will leave the R.A.F. Central Navigation and Central School, Shawbury, Salop, for Keflavik, Iceland, on the first stage of an arctic navigation flight. From Keflavik, in flights lasting over 13 hours each, training exercises will take the Lincolns over Greenland to a point some 400 miles from the North Pole. W/C. R. N. Wardell will be in command. The other three captains are F/L. J. Maxwell, F/L. C. O. Ellison and F/L. C. W. Eaton. Two students will fly in each Lincoln.

Army Rugby Champions

THERE can be little doubt that, on the play, the Army were lucky to beat the R.A.F. at Twickenham last Saturday in the final game of the Inter-Services Championship. They had been expected to win, but from the kick-off the R.A.F. forwards set such a pace and played with such determination that they kept the opposition on the defensive for almost the whole game and prevented the strong Army line from getting much of the ball. Had the R.A.F.'s inexperienced three-quarter line had more attacking strength, or made more use of the Springbok kick towards the corner flag, they must surely have won by a good margin. In addition, had either side—but particularly the R.A.F.—taken advantage of the very large number of penalty kicks awarded by the referee, the scores might again have been very different. As it was, the half-time score was 3 points all—a drop goal by Channer for the R.A.F. and a penalty by Edwards for the Army. At this time, with better place-kicking, the scores could have been 15-9 to the R.A.F.

Early in the second half the R.A.F. came near to scoring on Lodwig's wing, and soon afterwards a passing movement starting with Channer and going *via* Collingridge to Greenwood, brought a well-deserved touch-down. Smailes missed the fairly wide kick. Channer continued to drive the Army back with fine long touch-kicking.

The score was still 6-3 to the R.A.F. near full-time, when one of the many penalties finally enabled the Army—through Edwards again—to equalize. Then, in the last seconds, playing on injury time, Wood, the Army wing, forced through for a try to make the score 9-6 to the Army. The R.A.F. forwards were the heroes of the game—especially Stirling, Yarranton and Greenwood, and the outsides did nothing of which to be ashamed.

Royal Air Force Team.—*Full Back:* S/L. A. A. Smailes (Middleton St. George); *Three-quarters:* F/O. T. H. Lodwig (St. Athan); Off. Cdt. J. Syme (Spitalgate); A/C. K. R. MacDonald (Nuneham Park); A/C. G. M. Griffiths (Upwood); *Half-backs:* F/O M. R. Channer (Syerston); L. A/C. D. C. Wilcox (Innesworth); *Forwards:* F/O. P. O'K. Plumpton (South Cerney); F/O. A. H. Renine (Horsham St. Faith); F/L. R. V. Stirling* (Cranwell); F/L. P. G. Yarranton (A.M.); F/O. L. P. Shelley (Hereford); Off. Cdt. J. Greenwood* (Spitalgate); S/L. R. H. G. Weighill* (Capt.) (Staff Coll.); F/O. P. S. Collingridge (Cranwell). * International.

Air Ministry Appointment

IN May, A. Cdre. J. L. F. Fuller-Good, C.B.E., who has returned from Malaya, will become Director of Personal Services (A) at the Air Ministry.

A. Cdre. Fuller-Good went to Malaya in

SERVICE AVIATION . . .

1949 as Senior Administrative Officer at Air H.Q. and later commanded the R.A.F. Station at Changi on Singapore Island. Recently, in the interval between the departure of A. V-M. Blucke and the arrival of A. V-M. Mills, he was A.O.C. Malaya.

Australian Jet Fighter School

UNDER the command of S/L. P. C. Ottewill, G.M., No. 2 O.T.U. at Williamstown, New South Wales, has re-opened to give specialized training to Australian jet fighter pilots. Hitherto conversion from Mustangs to jets has been done by the operational squadrons.

Malayan Awards

THE following appointments and awards are in respect of R.A.F. operations in Malaya for the period June 1st to November 30th, 1951 :—

Distinguished Service Order.—S/L. G. C. Unwin, D.F.M.

Order of the British Empire (Mil. Div.).—O.B.E., W/C. T. G. Young, M.B.E.; F/L. W. A. Land, A.F.C.

Distinguished Flying Cross.—F/L. S. Mills, R.N.Z.A.F. and Major D. P. D. Oldman, R.A.

Distinguished Flying Medal.—Sgt. M. A. Clarke.

Military Medal.—Act. F/S. L. C. E. Harris.

Air Force Medal.—Sgt. J. C. Bowman.

British Empire Medal.—F/S. W. J. P. Mearns.

Mentioned in Despatches.—F/Ls. V. Bergman, D.F.C., C. K. Cooke, J. V. Cordery, N. Watts and J. F. Wilson; W/Os. G. T. Barrett and H. Melia; F/Ss. A. V. Flemington, L. C. Herriott, C. P. Lendon, N. Rossiter and T. Wareing; Sgts. E. F. Bean, R. A. G. Cockburn, H. A. Collins, L. S. J. Dyer, G. C. Hollands, V. W. Langstone, Syed Omar Bin Syed Othman, R.A.F. Regt. (Malaya), W. H. Taylor and J. G. Williams; Act. Sgt. L. McGeorge. S/T. H. C. Haresign; Cpls. Karish Bin Abdul Manam, R.A.F. Regt. (Malaya), Mohd Zain Bin Yaacob, R.A.F. Regt. (Malaya) and J. W. Tarrant; Act. Cpls. M. P. Champ, E. G. Mayne and H. D. Skinner; S/A Cs. A. Lanchester, S. Pearce and J. K. Walker; L/A C. Ketik Bin Salim, R.A.F. Regt. (Malaya).

R.A.F. Revue

AT Fighter Command H.Q., Stanmore, on Tuesday, March 18th, "The Rafters Revue" was presented in the Concert Hall, Stanmore Park. A great deal of hard work had obviously been put into the production, which was warmly received by a large audience. The company were particularly assured in the several comedy sketches and burlesques included in the programme, and an imaginative use of lighting, coupled with some ingenious decor, brought life to many of the scenes.

R.A.A.F. in Middle East

IN connection with the decision to base No. 78 Fighter Wing, R.A.A.F., in the Middle East, five staff officers have left Australia to discuss details at R.A.F. Headquarters, Middle East.

New R.C.A.F. Units

FORMATION of an interim Operational Training Unit by Air Transport Command has been announced by R.C.A.F. headquarters. It will provide training for aircrews of Canadair North Stars, Douglas Dakotas and Fairchild Packets. The unit, which for a while will be stationed at Dorval, is under the command of S/L P. L. Michel.

Early this month a new flying training school opened at Calgary. Designated No. 4 Flying Training School, the new unit will absorb the Pilot Refresher Training School, which has been operating at Calgary for some months past. W/C J. D. McCullum, A.F.C., is the commanding officer.

Swedish Visitors

A CONTINGENT of 49 students from the Swedish Air Force cadet school will fly in 20 Mustangs and two transports to the Royal Air Force College, Cranwell, for a visit lasting one week from April 3rd.

Before the cadets leave on Wednesday, April 9th, they will attend the graduation ceremonies of flight cadets from the R.A.F. College on that day, when the reviewing officer will be the Secretary of State for Air, Lord De L'Isle and Dudley.

N.A.T.O. INSPECTION: General Aldo Urbani, Chief of the Italian Air Staff, inspecting the Guard of Honour during his recent visit to Centralia, Ontario. General Urbani is studying the N.A.T.O. air training programme in Canada.

CANADIAN MASCOT: A cougar cub, which has been presented by the City of Vancouver to No. 410 (Cougar) Squadron, R.C.A.F., now stationed in Britain, arrived in England by air last week and will "live out" at the London Zoo.

Scots to Visit Ireland

FOR its summer training period this year, No. 1830 R.N.V.R. Squadron, which is based at Donibristle, Fife, will go to R.N.A.S. Eglington, Co. Londonderry. While in Ireland the squadron will varry out an intensive programme of anti-submarine exercises. Last year No. 1830 were embarked on the light fleet aircraft carrier H.M.S. *Vengeance*.

R.A.F.V.R. Navigator Instructors

NAVIGATORS in the R.A.F.V.R. who are 35 years old or over may now train as navigation instructors. In the event of war, reservists qualified under this arrangement would be posted to R.A.F. navigation schools in Britain, Rhodesia or Canada.

During training, reservists will be attached to an air navigation school for 15 days' continuous training in each of two consecutive years. If progress is satisfactory, a third 15-day period will be spent at the Central Navigation and Control School, Shawbury, Shropshire, where, after further instruction, they will be categorized as air navigation instructors.

"Eagle's" Church Dedicated

ON Sunday March 16th, St. John the Evangelist, the ship's church in the new carrier H.M.S. *Eagle*, was dedicated while the vessel was lying in Spithead. The Chaplain of the Fleet and Archdeacon of the Royal Navy, the Ven. Leonard Coulshaw, conducted the service. In his address to the crew he said that the Queen, who, as Princess Elizabeth, had launched the *Eagle* at Belfast in March, 1946, had taken a deep interest in the ship and all who sailed in her. Her Majesty had expressed a wish to be present at either the commissioning service or at the dedication of the ship's church. He believed that but for her access to the throne she would have been present.

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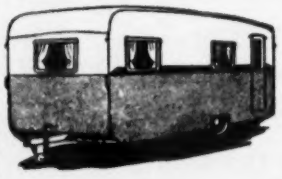

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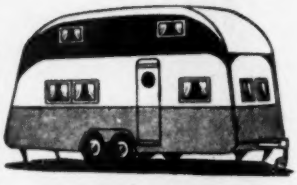

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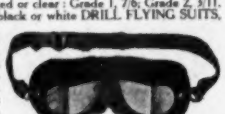

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Cables: AEROPAUL, London. [0941

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Beyond the unequalled radio supply and overhaul service currently offered by our Radio Division, we are actively engaged in the supply of large quantities of aircraft radar equipment, among which we have to offer up to 50 installations of

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This equipment has a proven record of performance which compares most favourably with any equipment in current manufacture.

H2S and ASV are designed to enable location of pin-points for the purposes of navigation and blind bombing in conditions of bad visibility and in dense fog. A picture of the terrain over which the aircraft is flying is presented in a plan position form on the face of a cathode-ray tube and the operator is thus readily able to compute the following particulars:—

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(b) An accurate bearing of the objects (this can be arranged so that either a true or relative bearing is obtained).

(c) The heading of the aircraft relative to compass North.

(d) An accurate indication of the height at which the aircraft is flying.

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It is obvious that the required units to complete each installation will vary from aircraft to aircraft, according to the exact requirements of the operator, thus necessitating notification of either the ARI number of the particular installation concerned or, alternatively discussion of the exact nature of clients' requirements to enable us to make a quotation.

Basically, each H2S Mark II and ASV Mark III installation consists of the following units:—

Transmitter Receiver.
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The Connector set can be supplied tailored to specific requirements.

Many extras are also available—Lucero, Fishpon, and D.R. Compass—to mention but a few.

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PATENTS

PATENTS ACT, 1949

NOTICE is hereby given that Dowty Equipment, Ltd., A. seek leave to amend the Complete Specification of the Application for Letters Patent No. 642,370 for an invention entitled "Improvements in liquid-fuel burners."

Particulars of the proposed amendments were set forth in the Official Journal (Patents), No. 3288, dated March 26th, 1952.

Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 34 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before April 9th, 1952.

J. L. BLAKE,
Comptroller-General.
[7817]

THE proprietor of British Patent No. 616314, entitled "Hinge Structure," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14, East Jackson Boulevard, Chicago 4, Illinois, U.S.A. [7970]

THE proprietor of British Patent No. 614426, entitled "Latch Assembly," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14, East Jackson Boulevard, Chicago 4, Illinois, U.S.A. [7971]

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HAVE available quantity R.A.I.B. receivers, SCR.269 radio compass, SCR.522 frequency meters, T.A.J. transmitters, SCR.522 v.h.f. equipments. All A.R.B. or equivalent released.—Box 7931. [7972]

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STAFF item checking and job-costing time recorders for (all makes) for quick cash sale; exceptional condition.—Box 7241. [0040]

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The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

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HATFIELD, HERTS [0351]

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Write to Secretary of the Admiralty (C.W.520 F.), Queen Anne's Mansions, London, S.W.1. [7822]

VICKERS-ARMSTRONGS, Ltd. (Aircraft Section) have vacancies at Hurn Depot for the following staff:—
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(aircraft experience preferable but not essential).
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APPLY, in writing, to Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey. Applications are subject to the approval of the Ministry of Labour and National Service. [7826]

HANDLEY PAGE, Ltd., have vacancies for:—
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BLACKBURN and GENERAL AIRCRAFT, LTD. require SENIOR JIG & TOOL DESIGN DRAUGHTSMEN for interesting work on Aircraft and Aircraft Engine programmes.
Apply Labour Office (open Saturday mornings), or Please write, stating age, experience and qualifications to THE PERSONNEL SUPERINTENDENT, BROUGH, EAST YORKS. [7891]

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SENIOR and intermediate draughtsmen.
STRESSMEN.
EXPERIENCED spares compilers.
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APPLICATIONS are invited for the following positions in the Aircraft Division of the English Electric Co., Ltd., at Warton, near Preston:—
1. ENGINEER for the design and development of a new supersonic wind tunnel project. Applicants should have good experience of this type of work. Degree or equivalent preferred. (Ref. 953B.)
2. ENGINEER for flight test liaison with the South of England. Applicants should have technical experience in the aircraft industry and an honours degree in engineering or its equivalent. (Ref. 953B.)
3. ENGINEERS for aero-elastic and allied investigations. Applicants should have aerodynamic or structural training and experience. (Ref. 435H.)
As these vacancies are for professional engineers, applications, giving full details and quoting appropriate reference may be addressed to Central Personnel Services, English Electric Co., Ltd., 36-30, Gillingham Street, London, S.W.1. [7945]
LINK TRAINER instructor required.—Apply: Chief Instructor, No. 25 Reserve Flying School, Wolverhampton. [7932]
WANTED, flying instructor with Mosquito experience. —Apply, C.F.I., Airwork, Ltd., R.N.A.S., St. Davids, Pembs. [7934]
SENIOR stressman required by South Coast firm for work of great interest. Excellent conditions.—Apply, Box 7400. [7799]
CHARTER company operating from Croydon require pilot immediately. R.A.L.P.A. rates paid. Applicant should give age, experience, licences, etc.—Box 7929. [7904]
THE DE HAVILLAND AIRCRAFT Co., Ltd., Airspeed Division, Christchurch, Hampshire, have the following vacancies:—
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SENIOR planning engineers, for machine shop, press and fitting shops.
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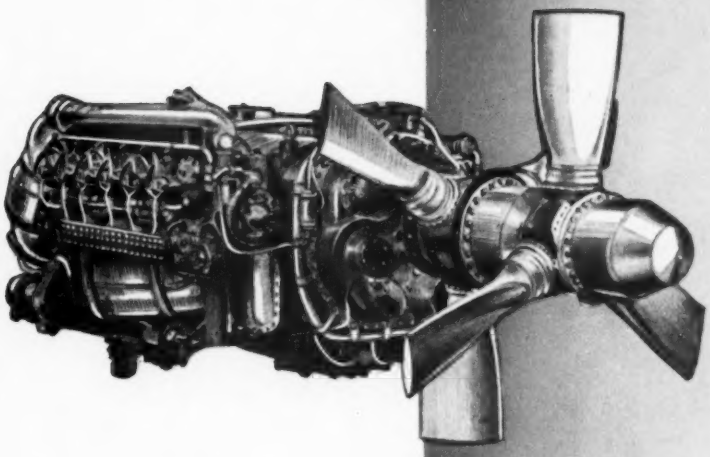

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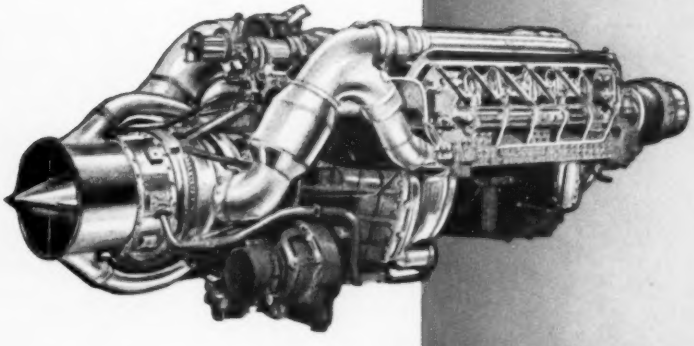

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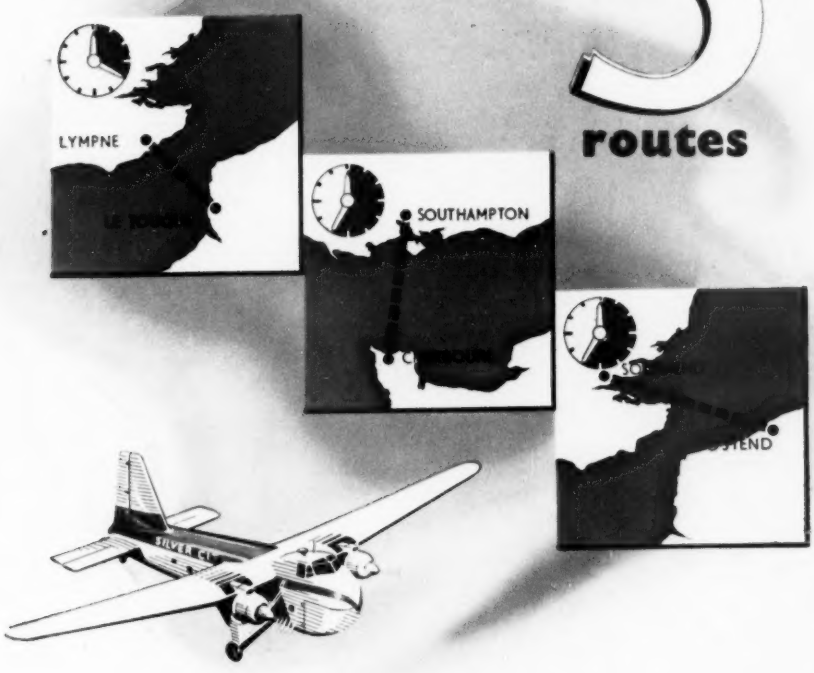

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